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Review of the 1989-1990 British Columbia Herring Fishery and Spawn Abundance

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INFORMATION BULLETIN

REVIEW OF THE 1989 - 1990 BRITISH COLUMBIA HERRING FISHERY AND SPAWN ABUNDANCE

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ABSTRACT

Chalmers, D.D. 1991. Review of the 1989-1990 British Columbia herring fishery and spawn abundance. Can. Ind. Rep. Fish. Aquat. Sci. No. 207: 129 p.

During the 1989-1990 fishing season in British Columbia, herring were harvested for food and bait during November and December 1989, sac roe during March and April 1990 and spawn-on-kelp during April 1990.

The total food and bait catch was 896.6 tons. The total sac-roe catch was 42,016 tons and had a landed value of approximatly 57.0 million dollars.

There were 28 Spawn-on-Kelp licences issued in 1990. Total production for this fishery was 493,533 lbs. with an approximate landed value of $8-9 million dollars.

The 1990 coastwide spawn area index was 52.6 million SAI. and was well above the 46.2 million SAI. recorded in 1989.

Key words: herring, sac-roe, food and bait, spawn on kelp, stock assessment.

RÉSUMÉ

Les activités de la saison de pêche au hareng de 1989-1990 en Colombie-Britannique ont été réparties de la façon suivante : la pêche pour la consommation et la pêche d'appâts s'est déroulée en novembre et décembre 1989, tandis que la pêche des harengs rogués s'est déroulée en mars et avril 1990, et la cueillette des oeufs sur varech, en avril 1990.

Les prises totales aux fins de consummation et d'obtention d'appâts ont été de 896.6 tonnes. Celles des harengs rogués ont atteint 42,016 tonnes, pour une valeur au débarquement de 57 millions de dollars.

Vingt-huit permis de récolte d'oeufs sur varech ont été délivrés. La production totale pour cette pêche s'est élevée à 493,533 lb. pour une valeur au débarquement de 8 à 9 millions de dollars.

En 1990, l'indice de frai à l'échelle de la Côte a été de 52.6 millions, soit bien au-delà des 46.2 millions enregistrés en 1989.

Mots clés hareng hareng rogué, consommation et appât, oeufs sur varech, évaluation des stocks.

INTRODUCTION

Pacific Herring (Clupea harengus pallasii) migrate to in-shore areas from offshore feeding grounds in the early fall and winter and then hold in sheltered bays and inlets in preparation for spawning in late winter and early spring.

During this time three major commercial herring fisheries occur; a Food and Bait Fishery, a Sac-Roe Fishery and a Spawn-on-Kelp Fishery.

The Food and Bait fishery takes place in November/December when the herring first move inshore and the fat content is high, while the sac-roe and spawn-on-kelp fisheries occur in March/April during the spawning season when gonad development is near or at maximum.

Once the herring have finished spawning, measurements of individual spawns are made in order to obtain estimates of abundance. Since the amount of spawn deposited is directly related to the number spawners, this information when combined with data on catch and age compositions enables Biological Services Branch researchers to make estimates of the overall herring abundance and age class strength. This data is also used to forecast the amount of herring that will return to spawn during the forthcoming year. (Haist and Schweigert. 1989) These forecasts along with biological and management implications are used to establish coast wide fishing areas and quotas for the next year.

METHODS

The major source of information for the Sac-Roe Fishery portion of this publication is extracted from a field Record of Management Strategies (RMS) and for the Food and Bait fishery and Spawn-on-Kelp fishery from in-house memoranda written by Fishery Officers. The RMS reports provide hydroacoustic abundance estimates and roe yield information as well as day to day accounts of management strategies used to manage the roe herring fisheries in each management area.

On the fishing grounds, tonnage estimates of stocks are determined acoustically using echo sounders and are subjective interpretations based on past experience of contracted charter vessel masters, patrol vessel masters and Fisheries field staff.

Spawn data is obtained from annual spawn reports compiled by Fisheries field staff. These reports document the timing and location of individual spawns as well as the length and width of spawn depositions, average layers of eggs on each type of substrate utilized, and percent of vegetation covered by spawn.

SPAWN SURVEY METHODS

During 1990, Fishery Officers used two different methods to collect spawn data:

1. Surface Survey

The traditional method used to estimate spawn deposition has been the standard surface based survey. This type of survey requires field staff to estimate the area of spawn, number of egg layers, and percentage of bare area in each spawn patch by pacing it out at low tide while making visual observations. For sub-tidal spawns a boat is used along with an underwater viewing box, to increase visibility, to determine the size and intensity of the spawn. In some cases, observations are made by snorkelling or towing a diver with a snorkel. In locations where the spawn extends to depths below visibility from the surface, a grapple or raking apparatus is used to determine the presence of spawn and collect vegetation samples to estimate the number of egg layers. The dimensions of the spawnings are plotted on large scale marine charts or shoreline vegetation maps made from aerial photographs (eg. Haegel and Hamey, 1979).

The traditional method has been unreliable in areas where spawns are deep and vegetation sparse or spotty. In addition, the effort tends to be inconsistent from both year to year and area to area depending on manpower and vessel availability. The inconsistency is reduced somewhat by having the surveyor report on the techniques employed, the effort expended and information on environmental conditions (eg. tide, water turbidity, weather).

2. Dive Survey

The second method utilizes SCUBA gear to dive and assess the spawn. Two different types of diving surveys have been developed and used in past years. The first one is a comprehensive survey developed by researchers at the Pacific Biological Station over the past decade. (Haegele and Schewigert. 1984) This is a very intensive type of survey and requires a considerable commitment of resource dollars, manpower, and time. The method employs a rigid and time consuming sampling system that can provide accurate and consistent estimates of spawn depositions over time.

After several years of comprehensive surveys in selected areas it was clear that the dive survey data was more accurate than that collected from the surface surveys mainly because the width, intensity and patchy areas of spawn deposited sub-tidal could be more accurately assessed.

Because of the high costs of comprehensive surveys, a modified diving survey, or Fishery Officer Dive Survey (FODS), was developed and first used on the West Coast of Vancouver Island and in the

Strait of Georgia in 1987. This type of survey utilizes Fishery Officers trained in SCUBA and either Department of Fisheries Patrol Vessels or chartered vessels as dive platforms. The method is similar to the comprehensive survey but differs in that only a limited number of vegetation/egg samples are taken each day. This not only saves time in surveying but also minimizes the amount of time and costs associated with processing samples.

The FODS survey can best be described as a means of improving the surface data by providing a more accurate assessment of the width, average egg layers, and bare areas within spawns.

Prior to 1987 all spawns were surveyed using the traditional surface methods. Spawn data from these surveys were converted to a standard measurement (standard square meters at medium intensity) so that spawnings could be compared from area to area and year to year (Chalmers 1988). With the development of dive surveys, both surface and dive surveys were conducted simultaneously in several areas and dive information on widths of spawn, percentage vegetation cover, and layers of eggs were used to supplement data collected by the shore based surface surveys.

In 1990 most of the major spawns along the coast were surveyed using the FODS method only. Other spawns, were surveyed using the traditional surface methods.
Although the dive survey estimates of spawn is more accurate there are problems in comparing the results of the two methods.
The most critical of these being the validity of making comparisons of historical estimates of standard square meters from surface surveys and those from dive surveys. In order to minimize confusion resulting from making invalid comparisons of standard square meters by the two types of surveys and yet still provide a method to permit comparisons where appropriate, a new spawn index was developed. This new index, called the Spawn Area Index (SAI) is calculated by multiplying the spawn length by the width, the average egg layers and the percent bare area. The spawn width is the average measured distance of all transects within the spawn, and percent cover is an average of all the observations in the surveyed area. For both surface and dive surveys, average egg layers are estimated by comparing layers of eggs for each vegetation type by the relative proportions of each vegetation. Tables 11 and 12 provide a time series of spawn data for the years 1985-1990. Areas where dive survey data are used have been asterixed.

1989 FOOD AND BAIT FISHERY

In October 1989, the Management Plans for the open Food and Bait fishery were issued to industry.(Appendix 1). The total allowable quota for the fishery was 1,250 tons, with 150 tons allocated to the North Coast (Area 3-5), 100 tons to the Central Coast (Area 6-10), and 1000 tons to the South Coast (Area 13, 17, 18).

In the North Coast, the five major fishing companies operating in Prince Rupert were canvassed to see if they wanted any herring from this allocation. Due to the low demand for both food and bait there was no interest by any of the companies in obtaining permits therefore there was no fishery.

In the South Coast, twenty 50 ton licenses were allocated to fishermen by means of a lottery draw. Two of the licences were to be fished in Johnston Straits (Area 13) and the remaining 18 were to be fish in the Lower Georgia Straits (Areas 17-18).

In Johnstone Straits, both licenses were used and the total catch was 100 tons. All of the fish came out of Deep Water Bay.

In the Lower Georgia Straits, only fourteen of the eighteen vessels fished and the total catch was 660 tons. The fishing area was opened on a weekly basis from 1200 hours Monday to 1200 hours Friday between November 13 and December 14.

The entire catch came from Area 17, with approximatly 560 tons being caught in Upper Stuart Channel near Yellow Point, and the remaining 100 tons being caught in Phylades Channel.

1990 ROE HERRING FISHERY

In November 1989 Management Plans for the 1990 Roe Herring Fishery were issued to industry (Appendix 2). These plans detail the area licensing system, management plan, catch quotas and the key regulations for this fishery.

In 1990 there were five separate licensed areas for both seines and gillnets.

The seine licence areas were West Coast Queen Charlotte Islands, East Coast Queen Charlotte Islands, Prince Rupert, Central Coast, and West Coast of Vancouver Island.

The gillnet licence areas were East Coast Queen Charlotte Islands, Prince Rupert, Central Coast, Strait of Georgia and West Coast Vancouver Island.

Each of the licensed areas was assigned a fixed catch quota for seines and gillnets prior to the fishing season and holders of roe herring licences were required to choose one of the areas in which to fish. These gear quotas are adjusted annually prior to each fishing season depending on the forecast run to each stock assessment area. Management considerations such as catchability of the fish, potential roe quality, and gear allocations between seines and gillnets are also considered when setting area quotas.

Once the quotas have been established they are fixed for that year and there are no in-season adjustments.

The pre-season fixed quota system allows fishery managers to set up fisheries on the first available stock of suitably mature fish. This not only provides for a more orderly fishery but in many areas of the coast it is the older, larger fish which spawn first and fishing on these herring can provide higher roe yields and hence increased profitability to industry.

In-season catch estimates, called "hails" are obtained from individual fishermen, who are required to hail their catches prior to leaving the fishing grounds. These figures are generally within 10-15% of the final sales slip data compiled from company landing slips. The hailed figures are used throughout the text because they are the ones that are used to determine whether or not the quota has been caught, and whether or not the fishery should be closed or remain open. Moreover, final sales slip information is not available until July or August well after the fishery is over.

In summary, the coast wide hailed catch for the 1990 roe herring fishery was 39,023 tons. Of this total 8,792 tons were caught in the Queen Charlotte Islands, 4,206 tons in the Prince Rupert area, 8,281 tons in the Central Coast, 8,255 tons in the Strait of Georgia, and 9,489 tons on the West Coast of Vancouver Island.

The landed value of this fishery was about 78 million dollars, and compares with 57 million dollars in 1989 (40,655 ton catch), 81 million dollars in 1988 (30,786 ton catch) and, 91 million dollars in 1987 (38,790 ton catch).

Table 1 details the licensed areas and the distribution of gear in each of the areas for 1990. For 1990 the coastwide roe herring quota was 33,846 tons, and was by regulation divided between the seine and gillnet sectors on a 55/45% basis (Table 2). The 1990 roe herring catches are given in Table 3 (Hailed Catch) and Table 4 (Preliminary Sales Slip Data). Tables 5 through 9 detail the annual roe herring catches by statistical area and gear type for the years 1985 - 1990. Table 10 provides an estimated landed value of the catch based on the average price paid for the seine and gillnet caught fish. The statistical areas are shown in Figures 1 - 2 and the 1990 fishing boundaries, fishing times and hailed catches are shown in Figures 3 -15

QUEEN CHARLOTTE ISLANDS (AREA 2E, 2W)

AREA 2E

Assessment

The assessment program commenced on Febuary 24 with the F.P.V. Arrow Post conducting an echo sounding survey from Cumshewa Inlet to Skincuttle Inlet. By Febuary 28 all of the areas had been surveyed and total stock estimate was 6,300 tons. Most of these fish were located in Sedgwick Bay where 3,500 tons were estimated. Another 2,000 tons were estimated in Lower Juan Perez Sound between Huxley Island and Werner Bay and the remainder of the fish were scattered throughout the area.

On March 9 stock estimates were up to 7,800 tons and by March 14 increased to 10,300 tons. Between March 14-24 estimates ranged from 10,000- 12,400 tons. The maximum tonnage sounded in Area 2E this year was 15,000 tons on March 29.

In Cumshewa Inlet only 100 tons was sounded during the entire assessment period except for the last day of sounding on April 4 when 200 tons were observed. Only one roe test was made in this location and this was on April 3. The fish had a maturity of 13.9% and average length of 22.2 cm.

In Selwyn Inlet sounding estimates were 150 tons between Febuary 24-March 13, then increased to 500 tons on March 14 and 1,000 tons March 21. The maximum tonnage was estimated between April 1-4 when 2,000 tons were observed. Roe testing was only carried out between April 1-4 with roe yields reaching a maximun of 14.9% The average fish size was 21.2 cm.

In Atli inlet the maximum tonnage estimated was 400 tons between March 20-31. There were no roe tests carried out in this location.

In Juan Perez Sound, 4,500 tons were located on Febuary 24. This estimate gradually increased to 8,500 tons by March 17-18 and up to a maximum of 9,200 tons between March 25-26. The fish were mainly concentrated in Sedgwick Bay and Burnaby Straits. Roe testing was carried out throughout the program and yields remained fairly low despite the large average size of the fish. The maximum roe maturity tested was 12.2% on March 24 in Burnaby Straits. The last roe test made in Juan Perez was on March 25 and the roe yield averaged 11.9% Average fish size for all the tests ranged from 21.5-22.4 cm.

In Skincuttle Inlet the roe yield was up to 9.9% by March 13, and on March 23 had reached 13.1%, the highest recorded in Skincuttle Inlet this year. The fish were quite large throughout the assessment period averaging 21.8-22.6 cm.

While there were sufficient stocks in Area 2E to warrent a fishery it was felt by both the DFO. staff and Industry Advisors on the fishing grounds that there would be higher quality roe obtained if the fishery took place in Louscoone Inlet. As a result the fleet moved to Louscoone Inlet on March 25.

Fishery

Seine

The Area 2E seine fishery took place in Louscoone Inlet this year because this area provided the best opportunity in the Area 2E assessment area for high quality roe herring.

The fishery took place on March 26 in sub-areas 2-31A, 2-32, and 2-33A, between 0930-1347 hrs.(4 hrs. 17 min.) (Fig. 3). There were 54 seines licensed for this area and they hailed a catch of 5,800 tons. This was 1,800 tons over the 4,000 ton quota. Individual hail catches ranged from 5 tons to 600 tons and 42 of the vessels caught fish.

Gillnets

The Gillnet Fishery took place on April 8, between 0830-1740 hrs. (9hrs. 10 min.) (Fig. 5). There were 72 punts licenced to fish and they hailed a catch of 1,247 tons. The gillnet quota for this area was 1000 tons. Sub-areas 2-12A, 2-13 (with the exception of 2-13A) and 2-14A were initially opened. At 1315 hrs. the area was extended to include sub-area 2-16.

In general fishing was most consistant around Section Island and east of Section Cove. At the beginning of the fishery, shakes averaged 1-1.5 tons per hour and remained steady throughout the morning dropping off in the afternoon then picking up during the final hour of the fishery.

AREA 2W

Assessment

Stock assessment in Louscoone Inlet began on Febuary 28 when 1,000 tons were estimated in the outer portion of the inlet. This estimate remained the same until March 11 when it was increased to 2,000 tons. Stocks continued to build and by March 25 were up to the maximum of 6,000 tons. After March 26 stock estimates declined to 2,000 tons and remained at this level until the end of the assessment program on April 4.

Roe maturities started increasing on March 11 when a test set in outer Louscoone indicated a maturity of 7.4% and an average fish size of 22.5 cm. By March 19 the maturity had increased to 13.2%. On March 26, the day of the fishery, a test set just prior to the opening yielded a maturity of 15%. Of the 15 roe tests made in Louscoone only two had average fish lengths below 22 cm.

In Port Louis, assessment began on Febuary 25 at which time 200 tons were estimated. By Febuary 28 the entire location had been surveyed and total stock estimate was up to 1,500 ton. This estimate was was further revised up to 2,500 tons on March 2 where it remained until the day after the fishery on March 18 when it was increased to 3,000 tons. There were no further soundings in this location after this date as all the assessment vessels were in Louscoone Inlet assisting in the Area 2E fishery.

In Rennell Sound stock assessment began on March 1 and 300 tons were sounded. A roe test indicated a maturity of 0% and average fish size of 23.1 cm. By March 11 stock estimates had increased to 2,000 tons and a roe test on March 14 indicated a maturity of 7.3% and average size of 23.6 cm. Another roe test the next day had a maturity of 9.7% and average size of 22.7 cm. This was the last roe test made in this location. On March 23, 5,000 tons were sounded and by April 5, the last day of the assessment program only 1,000 could be located.

In Inskip Inlet the maximum tonnage assessed was 1,000 tons on March 3. Stock assessment was very sporatic in this location and the next date this location was assessed was on March 12, when 500 were observed. There were no roe tests made in this area.

Seal Inlet was assessed on March 1-3 when 400 tons were estimated and again on March 9 for 1,000 tons. Three roe test were made between March 1-9 and the roe maturity in all three tests were 0% with an average size of 22.6-23.5 cm.

Only 600 tons were sounded in Port Chanel between March 3-12.

FISHERY

Seine

Prior to the fishery in Area 2W the licenced vessel masters advised the fishery managers that they wanted to have a "pool" style fishery instead of the standard open style. The rational for this was that it might offer more control by slowing down catch rate by limiting the number of sets in the water and would facilitate slower pumping and more carefull handling of the fish thereby enhancing the overall quality. It would also reduce the hazards of damaged fishing gear and collisions that can occur in open seine fisheries.

On March 18 between 1030-1719 hrs. (6 hrs. 49 min.), sub-areas 2-92 to 2-97 were opened (Fig. 4). There were 11 licenced seines and they hailed a total catch of 1,745 tons, 643 tons over the 1,102 ton quota. Some possible reasons for the excessive catch are:

1. The acoustically sounded stock estimates were much lower than the actual stock size in the fishing location.
2. Fishermen had difficulty in determining tonnage in their nets because of the large catches made in

shallow water with the fish sitting on the bottom inside the seine

3. The hailing from the catcher vessels was very inaccurate. Subsequent sales slip catch data indicate that 2168 tons were actually caught which was nearly doubled the 1102 ton quota.

The roe quality of the fish was reported to be very good ranging from 13.0-15.9 %

PRINCE RUPERT (Area 3-5)

AREA 3-4

Assessment

The hydroacoustic assessment program began on March 6 at which time 4,000 tons were located in Stuman Bay. The first roe test was done on March 14 and the fish tested out at 0% roe yield and had an average size of 21.7 cm. By March 15 the sounding estimate increased to 6,500 tons in Stuman Bay with a further 485 ton scattered throughout the area for a total of 6,985 tons. This was the maximum tonnage sounding in Area 3-4 this year. A roe test in Stuman Bay on March 17 indicated a roe maturity of 2.4% and average size of 21.7cm.

After March 17 fish began moving out of this area and on March 19, 3,000 tons were located in Cummingham Pass. There were no fish located in Stuman Bay at this time. The fish continued moving down and by March 21 were showing up in Pearl Harbour. There were 4,000 tons sounded here on this day and a roe test indicated a maturity of 4% and average size of 21.6cm.

On March 24 5,000 tons were estimated in Big Bay and a roe test indicated a maturity of 8.5% and average size of 21.6 cm. Stock estimates at this time were low because large schools were observed in the shallows tight to the beach by aircraft and could not be seen by vessel sonars. A roe test in Big Bay on March 25 had a maturity of 9.4% . The fish tested were part of a large school stiring up mud close to the beach off Shattock Point.

On March 25 small spawns were observed during the evening along the outside and on the south end of Burnt Cliff Island and at Belletti Point. Spawning continued and by the next day were also occuring at Simpson Point and in Pearl Harbour.

By March 27 spawning was taking place throughout the area and in anticipation of a fishery four gillnet test sets were made in different locations. The first test at Pearl Harbour yielded 11.2 %, the second between Burnt Cliff Island and South Island yielded 9% the third at Simpson Point resulted in 11.6% and the fourth at

Trenham Point yielded 9.5%. All four tests had a high male count and industry representatives looking at the roe were concerned about the quality. The fish seemed to be of good size but the roe skeins were very small. It was generally felt however that the roe would more than likley not get any better and considering the large amount of spawning taking place, a fishery could not be delayed. A roe test in Pearl Harbour on March 27 had yielded only 5.5% and contained a very high incidence of spawned out fish. As a result of this test it was decided that the fishery would be set up to exclude this location.

FISHERY

Gillnets

On March 28 sub-areas 4-5A, 4-7, 4-8, and 4-9A was opened from 0830 - 2100 hrs.(12 hrs. 30 min.) (Fig. 6). There were 186 punts licenced for this area and they hailed a catch of 2,500 tons, just over the 2,137 ton quota. Initially the fleet was concentrated between Reeks Point and Tree Bluff, however within a few hours there was a general movement towards the inside south shore of Big Bay and to Burnt Cliff Island. There were 23 roe tests made during the fishery and the roe yields ranged from 10%-14% The low percentage had come from a test near the leading edge of the spawn at Tree Bluff.

AREA 5

Assessment

The hydroacoustic assessment program began on March 8, however no stocks were observed until March 15 when 1,400 tons were estimated in Willis Bay. By March 19 this estimate had increased to 2,500 tons with a further 600 tons off the west side of Gurd Island. A roe test in Willis Bay indicated a roe yield of 1.8% and average size of 20.8 cm. On March 26 4,000 tons were sounded in Willis Bay and another 1,300 tons were located off Gurd Island. This was the maximun tonnage sounded in Kitkatla Inlet this year and is one of the lowest maximum soundings for this location on record. There were two roe tests made on this day, one in Willis Bay averaged 6.8% while the other made at Gurd Island averaged 6.7%. The average fish size for both these tests were 21.1 cm.

Over the next few days the fish did not show very well and there was a lot of small scattered schools throughout the area.

By March 30 roe maturities were up to 11.8% but industry representatives felt that a few more days were required to let the quality improve.

On April 2 roe tests were ranging from 10.9-13% and it was thought that even if there were insufficient stocks to meet the quota a fishery should still take place.

On April 3, 1,300 tons were sounded in the Phoenix Island area. One roe test off Snass Point averaged 13% roe maturity and another off Kitkatla Creek averaged 12.2% maturity. The average fish size for these two tests were 21.1 and 20.9 cm. respectively.

There was very little sounding effort after the seine fisheries as the charter vessels were concentrating on obtaining their charter payment. Spawning began on this day near Kitkatla Creek.

FISHERY

Seine

There were two seine openings in this area. The first fishery took place on April 3 between 0932-1800 hrs. (8 hrs. 28 min.). Sub-area 5-5 and portions of sub-areas 5-4, 5-8 and 5-9 were opened (Fig. 7). There were 16 seines licenced for this fishery and the hailed catch of 718 tons was well short of the 1,700 ton quota.

The next opening occured on April 4 between 0701-1814 hrs. The same sub-areas as the previous day were opened except the closed portion of sub-area 5-4 was opened at 0855 hrs. (Fig 7). The hailed catch for this fishery was 988 tons bringing the total catch for both fisheries to 1,706 tons.

CENTRAL COAST (AREA 6-10)

UPPER CENTRAL COAST (AREA 6-7)

Assessment

Area 6

On March 3, 1,700 tons of herring were located in Kitasu Bay, and a roe test indicated 0% maturity and an average fish size of 21.2 cm. This estimate increased to 5,400 tons on March 7 and between that date and March 18 ranged from 2,500 to 5,000 tons. There was no increase in roe maturity until March 15 when a test indicated a maturity of 8%.

On March 19 there was a large movement of fish into the bay and sounding estimates went up to 10,000 tons. This was the maximum tonnage sounded in Area 6 this year. By the next day most of the fish had moved out of the location and the estimate dropped back to 4,100 tons. Roe maturities increased gradually and by March 21 were up to 13-14%. The average size of fish was fairly consistant throughout the period of assessment and ranged from 20.8-21.3 cm. in average length.

The only other fish seen in this area during the assessment was in Thistle Pass where 300-500 tons were sounded between March 11-22 and 4,000 tons on March 23. The 4,000 tons sounded on March 23 may have been some of the fish that moved out of Kitasu bay on March 20.

Assessment

Area 7

The assessment program began on March 1 and by the next day stock estimates were up to 13,000 tons. Stocks continued to increase and by March 8 were at 19,800 tons, the maximun tonnage sounded in the Central coast this year. Estimates declined slightly and ranged between 13,000-17,000 tons from March 10-18 then to 7,000-9000 tons until March 27, the end of the assessment program.

There were three main concentrations of fish in Area 7. They were Seaforth Channel, Spiller Channel, and East Higgens Pass.

In Seaforth Channel 11,000 tons were sounded on March 2 but declined to 5,900 tons by March 10 as the fish moved out into other areas. A roe test on March 2 yielded 0% maturity and average fish length of 21.7 cm. Another roe test on March 10 indicated that the maturity was still at 0%. There was no further testing on these fish. Between March 11-27 sounding estimates ranged from 2,100 to 3,800 tons.

In Spiller Channel, 1000 tons were sounded on March 2 and by March 12 the estimate had increased to 6,000 tons. Soundings remained fairly consistant ranging from 4,000-6,000 tons until March 19 when they declined to 2,000 tons after the fishery and then to 1,000 tons on March 24.

Roe maturities remained at 0% until March 14 when a test off Foote Island indicated a roe yield of 8.5% and average size of 21.4 cm.

Roe maturities continued to increase and by March 17 were up to 13.5%. On March 18, the day prior to the seine fishery, a test at Neekis had a roe yield of 15.3% and average fish size of 21.6 cm. The last roe test in Spiller Channel was made on March 23 and this test had a roe yield of 15.6%.

In East Higgins Pass, 2,500 tons were sounded on March 4. This estimate increased to 5,500 tons on March 6 and remained at this level until March 16 when the fish began moving out and stock estimates declined to 1,200 tons. Between this day and the end of the program daily stock estimates ranged from 1,500-2,500 tons.

Roe maturities remained low until March 22 when a test indicated a maturity of 12.5% and average fish size of 21.9 cm. The last test made in East Higgins Pass was on March 26 and had a roe yield of 12.6%.

Fishery

Seine

The first seine fishery took place in Spiller Channel on March 19 in Sub-area 7-14A on March 19 (Fig. 8). The area was opened from 1102-1600 hrs.(4 hrs. 58 min.) and 51 of the 59 licenced vessels caught fish. The hailed catch was 3482 tons with individual catches ranging from 5 tons to 420 tons.

The second opening took place on March 24 in Spiller Channel. Sub-areas 7-13A and 7-14A (Fig. 8) opened from 0902-0918 hrs. (16 min.). Of the 59 vessels fishing, 39 caught fish and hailed a catch of 1,657 tons. This brought the total catch for both openings to 5,139 tons, 161 tons short of the 5,300 ton quota.

Roe yields for both the seine openings were reported to be very good ranging between 13-17%.

Gillnets

The first gillnet opening was on March 28 in Sub-areas 6-16A, 6-18 and 7-18 (Fig. 9 and Fig.10) These areas were opened from 1000-1800 hrs.(8 hrs.). The 55 skiffs fishing in Stryker Bay hailed a catch of 761 tons and when added to the 874 tons caught in Kitasu Bay brought the total for the day to 1,635 tons.

The second opening was on March 29 between 0800-1530 hrs (7 hrs. 30 min.) in Sub-areas 6-16A, 6-18, 7-18, 7-19. (Fig. 9 and Fig. 10) There were 66 skiffs fishing in Stryker Bay and 32 fishing in Thompson Bay and they hailed a catch of 1,026 tons. There was also 402 tons caught in Kitasu Bay for a total days catch of 1,507 tons. The total hail for the two day fishery was 3,142 tons, 224 tons over the 2,918 ton gillnet quota.

LOWER CENTRAL COAST (AREA 8,9,10)

Asssessment

Assessment in Areas 8-10 was sporatic and was only carried out when vessels could be released from the upper central locations where commercial fisheries would take place..

In Area 8, the first sounding was on March 3 and 4,500 tons were observed in Kwakshua Channel. This was the maximum tonnage seen in the area this year. A roe test yielded a maturity of 0% and average size of 20.6 cm.

The next assessment was on March 9 when 2,500 tons was sounded. Another roe test indicated a 0% maturity and average fish length of 20.4cm.

The last sounding was on March 23 and 2,000 tons were seen. There was no roe test made on these fish.

In Area 9 the first assessment was on March 14 when 4,000 tons were seen in Kibella Bay. A roe test on these fish indicated 5% maturity and average fish size of 18.7 cm. This was the only test made in this area.

The next assessment was on March 22 but only 300 tons were sounded.

In Area 10, stock assessment was limited to one day due to a lack of assessment vessels. This occured on March 12 and 1,700 tons were estimated in the area. A roe test indicated 1% maturity and average fish size of 19.7 cm.

STRAIT OF GEORGIA (Area 13-18)

AREA 13

Assessment

There was very little stock assessment carried out in this area this year as the assessment vessels spent most of their time concentrating on the lower Gulf areas in anticipation of having fisheries there.

On Febuary 26, 2,000 tons were estimated in Okisollo Channel/ Deepwater Bay and a roe test indicated a maturity of 0% and average fish size of 18.0 cm.

The next assessment in this area was on March 5 when 4,000-5,000 tons were assessed. A test on these fish indicated they were all juveniles with an average size of 17.0 cm. There was no further stock assessment in this area.

AREA 14

Assessment

On Febuary 19, 6,000 tons were estimated in Deep Bay, and a roe test on Febuary 21 yielded 0% maturity and average fish size of 20.6 cm. By Febuary 27 this estimate had increased to 11,200 tons with 9,000 tons located in Deep Bay and 2,200 tons in the lower part of Lambert Channel.

In Area 14 spawning began on March 1 in front of Fillongly Park in Lambert Channel. It was quite small averaging 800 meters long by 300 meters wide. The intensity was light averaging .25-1 layer thick. The spawn increased and by the next day on March 2 was up to 3 kilometers in length, with spawning also being observed from Whalebone Point northward.

While spawnings continued over the next several days, they were characterized by being small and scattered over several locations and there did not seem to be any opportunity to begin the gillnet fishery.

Even though spawning was continuing throughout the area sounding estimtes were up to 17,700 tons total with 8,750 tons in lower Baynes sound, 5,000 tons between French Creek and Northwest Bay, and 4,000 tons in Lambert Channel.

Roe testing in Lower Baynes Sound and Lambert Channel yielded maturities of 2.5% and 5.8% respectively. The fish in Lambert Channel were slightly larger averaging 21.3 cm. compared to the 20.1 cm. average for the fish in Lambert Channel.

On March 5, stock estimates were up to 24,500 tons and was the maximum tonnage assessed in Area 14 this year.

Stock estimates declined to 15,000-16,000 tons on March 7 but were scattered in small schools and were very difficult to assess. There were three roe tests made this day; one at Cape Lazo had a roe yield of 5.8% and fish size of 20.6 cm., another at Eagle Rocks had a roe yield of 11% and fish size of 20 cm. and the third was made off Komass Bluffs and had a roe yield of 10.7% and fish size of 21.4 cm.

Stocks estimates continued to decline and after March 8 estimates varied from 800-4,000 tons until the end of the assessment program on March 18.

Spawnings continued throughout this period but were small, scattered and light in intensity. There was never a single major spawn in Area 14 this year.

FISHERY

Gillnets

The first fishery took place on March 14-15 in Sub-Areas 14-9, 14-11, 14-12, and 14-13 (Fig. 11) The area was opened from 1600 hrs. March 14 to 0930 hrs. March 15 (17 hrs. 30 min.) There was 373 double licenced skiffs for this area and they hailed a catch of 2,255 tons, far short of the 7,800 ton quota.

At the request of company representatives prior to the fishery, 20 roe tests were made throughout the opening and they ranged from 3.8%-16% roe yield.

Several companies reported problems of irregular shaped roe caused by the pre-spawning herring gorging themselves on eggs already deposited. This resulted in the eggs in the skines being crowded by the full guts and becoming misshapen.

The second opening took place between March 22-March 24 in Sub-areas 14-1, 14-2, 14-3, 14-4, 14-5, 14-9.(Fig. 12). This area along with Sub-areas 17-4, 17-5, 17-6A, 17-7A, 17-10, 17-16A, (Fig. 13) was opened from 1130 hrs. March 22 to 0300 hrs. March 24 (39 hrs. 30 min.)

Initially the majority of the fleet was concentrated in Area 14 near French Creek (265 skiffs) with the remainder in Area 17. As the fishery progressed and fishing slowed down in Area 14 the fleet moved down into Area 17. Roe maturities were reported to be very good in all areas fished, averaging 14%-15% and the problem of misshapen roe that occured during the first opening did not show up during this opening. The hailed catch from this area for this opening was 2,400 tons bringing the total Area 14 catch to 4,655 tons.

AREA 15

ASSESSMENT

Stock assessment began on Febuary 21 at which time 6,000 tons were located between Grief Point and the pulp mill. The next day this estimate was increased to 15,000 tons and a roe test indicated a 0% maturity and an average fish size of 19.9 cm.

By Febuary 27 sounding estimates had reached a maximum of 33,000 tons and and the fish were spread out between Sliammon and Albion Point. This was one of the highest acoustic stock estimates for this area in recent years. Roe maturities were still at 0% and fish size averaging 20.1 cm.

On Febuary 28 the fish began moving further off shore and sounding estimates declined to 16,000 tons. Stock estimates continued to decrease and by March 5 were down to 7,000 tons. This seems to be the normal pattern for this area and past tagging studies have indicated that most of the fish sounded early in the Powell River area move across to Area 14 to spawn.

Two roe tests on March 5 averaged 2% and 0.% maturity with average fish sizes of 19.0 cm. and 18.6 cm. respectively. This seemed to indicate that the larger more mature fish were breaking off and moving elsewhere. These were the last roe test made in this area as the testing vessels were concentrating their efforts in Area 14 and 17 where it looked most promising for a fishery.

By March 9 sounding estimates were down to 250 tons and on March 12 a small spawn took place near Sliammon.

There was never any more than 300 tons of fish seen in this area after March 12 and these were reported to be small fish

AREA 17

Assessment

Area 17 is split into two sections, Area 17N which includes Nanoose Bay and Northumberland Channel, and 17S which includes the area below Dodds Narrows.

In Area 17N, assessment began on Febuary 21 and 8,000 tons were sounded in Northumberland Channel near Snake Island. Stocks remained at this level until March 1 when the estimate was increased to 10,000-11,000. On March 7 the fish began moving out of this location and estimates declined to 7,000 tons then down to 4,000 tons on March 8. Between March 12-17 estimates were at 2,000 tons with a further reduction to 700-800 tons on March 18-19. On March 21 there was a large influx of fish and estimated increased to 4,100 tons. This increase was more than likley a result of fish moving up from Area 17S where there was a noticeable decline is stocks in that area a few days earlier.

Roe maturities remaind low throughout the assessment period and reached a maximum of 9.7% on March 14. The average size of fish ranged between 18.5 cm. to 20.1 cm..

In Area 17S fish did not begin to show up until Febuary 28 when 3,100 tons were sounded in lower Trincomali Channel. Roe test on these fish indicated maturities of 4.8% and an average fish size of 21.3 cm. This estimate was increased to 4,400 tons on March 4 then declined to 125 tons by March 8 as the fish were thought to move up into the Upper Stuart Channel area.

Stock estimates in Upper Stuart Channel increased from 300 tons on March 10 to 5,000 tons by March 14 then up to 15,000 tons on March 17. There was a slight decline to 10,000 tons on March 20 as some of the fish were seen to move through the narrows into Northumberland Channel.

Roe maturities in Upper Stuart Channel were quite high with a 10.5% test on March 13, a 11% test on March 15 and a 14.0% test on March 21 just prior to the gillnet fishery. The average fish size ranged from 19.7-20.4 cm.in length.

There was no further assessment made after March 21.

FISHERY

Sub-areas 17-4, 17-5, 17-6A, 17-7A, 17-10, 17-16A, opened to gillnet fishing on March 22 at 1130 hrs. and closed March 24 at 0300 hrs.(39 hrs. 30 min.) (Fig. 13). Even though there was very little spawning going on prior to the opening, seine testing had indicated all the fish were ripe and that any fish caught would produce good quality roe.

Fishing was initially very slow with only 108 of the 373 licenced skiff fishing in this area. As the catch rate in Area 14 declined the fleet fishing there began to move down and by the closure all of the skiffs were fishing in Area 17.

The total hailed catch from this area was 3,600 tons and when added to the 4,655 tons caught in Area 14 brought the total catch for the Strait of Georgia to 8,255 tons. This was 455 tons over the 7,800 ton gillnet quota. Roe recovery was reported to be very good averaging 14-15%

AREA 18

Because of the scaricity of herring in this area, assessment was only carried out when there was a vessel available from the other areas.

On March 23, 700 tons were located in Captains Pass and a roe test indicated a maturity of 0% and average fish size of 20.3 cm. The stock estimate was increased to 2,700 tons on March 27. and another roe test indicated a maturity of 1%. There was no further roe testing in this area. Stocks appeared to move out of the area by March 28 as sounding estimates ranged from 100-300 tons for the remainder of the assessment program.

WEST COAST OF VANCOUVER ISLAND (Area 23-27)

AREA 23

ASSESSMENT

Stock assessment began on Febuary 21 and by Febuary 23 all of Area 23 had been surveyed. The total stock estimate at this time was 15,600 tons. Most of these fish were concentrated in West Barkley Sound where 14,000 tons were sounded. An additional 1,600 tons were located in Imperial Eagle Channel. Roe testing throughout the Barkley Sound area indicated a 0 % roe maturity and an average fish length of 21.7 cm. Stocks remained at this level until March 1 when estimates declined to 9,000 tons. Between March 1-8 the fish spread out into smaller scattered schools as the weather deteriorated and daily stock estimated ranged from 3,300-10,500 tons.

By March 3 roe maturity began increasing and a roe test off Chrow Island on this day indicated a maturity of 3%. Another test off Meares Bluff in Imperial Eagle Channel had a roe maturity of 5.2%. The average size of the fish tested throughout the area was very consistant and ranged between 20.9 - 22.3 cm. in length, with most of the tests having having average sizes of around 21.5 cm. On

March 4 a test off Forbes Island indicated a roe maturity of 10.1% and another test in Toquart Bay had a maturity of 10.2%.

By March 9 the weather improved and the stocks began to come together once again. Sounding estimates increased to 17,700 tons and was the maximum tonnage sounded in Area 23 this year. These fish were mainly concentrated in the West Barkley Sound Area between Mayne Bay and Forbes Island, where 15,000 tons were located. The remaining 2,700 tons were sounded in Sechart Channel (500 tons), Imperial Eagle Channel (600 tons), and Trevor Channel (1,600 tons).

Roe testing throughout the West Barkley Sound Area between March 8-11 ranged from 13.1-14.4 % and average fish size was 22.0 cm.

There was no further assessments made until March 17 as all assessment vessels were involved in setting up the seine fishery and obtaining charter payment fish for the West Coast and Strait of Georgia charters. Two roe tests were made on March 11 just prior to the fishery. One off Chrow Island had a roe maturity of 14.4% and the other in David Channel had a maturity of 13.5%

Between March 17 and March 22 when the assessment program ended stock estimates ranged from 9,000-13,000 tons. The last two roe tests were made on March 19; one at Capstan Island in Sechart Channel had a maturity of 15% and one off Forbes Island had a maturity of 13%.

The major spawning began in Barkley Sound on March 23.

FISHERY

Seine

The first opening took place on March 11 between 1001-1500 hrs. (4 hrs 59 min.) in Sub-Areas 23-8A, 23-9, 23-10A (Fig 14). There were 99 seines licenced to fish and they hailed a catch of 3,300 tons well short of the 6,513 ton quota. Just prior to the opening large schools of fish were observed in Macoah Pass and seaward off Forbes Island, and it was speculated that the fishery could be very short because of the potential for some very large catches there. Once the area was opened however, the fish had scattered due to the large concentration of fishing gear and fishing turned out to be very slow. In consideration of the large amount of fishing gear in the area and the slow catch rate the decision was made to close the fishery at 1500 hrs. At this time the hailed catch was 3,300 tons and about one half of the quota was remaining. This would make for a reasonable fishery on the next day. Industry reported roe maturities to be very high and of good quality . During this opening 78 vessels hailed catches ranging from 2 tons to 250 tons, with the average hail being 50 tons.

The second opening took place on March 12 between 1000-1452 hrs (4 hrs. 52 min.) in Sub-areas 23-8A, 23-9, 23-10A, 23-10B, 23-11A. (Fig. 14). All 99 licenced vessels participated and 71 of them made catches ranging from 2 to 150 tons. The hailed catch for this fishery was 3,994 bringing the total catch for both openings to 7,294 tons.

Similar to the first opening, heavy dense school were observed in the Macoah Pass and Forbes Island areas but once the area was opened these schools scattered and were difficult to catch.

Area 23-11A was opened later than the main fishing area at 1415 hrs. because catches had dropped off to nothing and there was still 600 tons remaining in the quota. Sounding estimates in this location were thought to be about 600-800 tons which would be just enough to fulfill the quota. As it turned out either this estimate was in error or new fish moved into 23-11A immediately prior to or during the opening resulting in the fishery exceeding the quota.

AREA 24

ASSESSMENT

For assessment purposes Area 24 is divided up into two sections: upper Clayoquot Sound which includes Hesquiate Harbour, Sydney Inlet and Shelter Inlet and lower Clayoquot Sound which includes Cypress Bay, Maurus Channel, Father Charles Channel, and upper and lower Miller Chanel.

In upper Clayoquot sound the assessment program began on Febuary 23 and the only location in which any fish were seen was in Sydney Inlet where 8,000 tons were sounded along the west shore. A roe test indicated 0% roe maturity and an average fish length of 22.4 cm. By March 1 the roe maturity of these fish had increased to 3% and stock estimates ranged from 8,000 - 10,000 tons. This estimate was increased to 11,000 tons on March 2 and was the maximum tonnage sounded this year in this location. Although there was no fish observed in Hesquiate Harbour, a major spawn began on March 3 and continued until March 7. This is not unusual since Hesquiate Harbour is very shallow and when fish move into it they tend to breakup into small scattered schools making it very difficult to sound.

In Sydney Inlet stock estimates began to decline on March 5 and between March 5-16 sounding estimates in Sydney Inlet ranged from 2,500-4,500 tons.

By March 2 roe maturities in Sydney had increased to 10.1% and then quickly increased to 13.9% on March 4. The highest roe maturity observed in Sydney Inlet was 15.9%, tested on March 6. These fish had an average length of 21.6 cm. The roe maturities remained high and another test on March 16 had a maturity of 15.5%. Unlike 1989 when the fish did not fully mature before moving out of the inlet, there were several good opportunities for seine fisheries in Area 24 this year.

In lower Clayoquot Sound fish did not show up until March 7 when 2,000 tons were assessed in Miller Channel. Roe tests made on these fish on March 8 averaged 16.5% with the fish averaging 21.7 cm. in length. On March 8 a further 1,400 tons were sounded in Cypress Bay and by March 10 the estimate had increased to 3,000 tons then up to 4,500 tons on March 12. Stock estimates remained at this level until the end of the sounding program on March 21. It should be noted that roe tests on these fish were very high and averaged 13.7-15.3%.

FISHERY

The gillnet fishery took place on March 21 from 1000-1700 hrs. (7 hrs.) in sub-areas 24-6A and 24-7A (Fig. 15). There were 122 skiffs licenced for the area but only 118 could be accounted for prior to the fishery. It was thought that the unaccounted skiffs may have been double licenced for the Strait of Georgia and were waiting there for that fishery. The quota for this fishery was 1,376 tons and the hailed catch was 2,195 tons. Roe maturities were reported to be very good with tests ranging from 11%-14%. Approximately 87% of the gear operated in the Elbow Bank/Maurus Channel area and the balance in the Yellow Bank/Ritchie Bay area.

AREA 25

ASSESSMENT

Nootka Sound- There were very few fish observed in Nootka Sound this year and the maximum tonnage sounded was on Febuary 27 when 300 tons were located off Maquinna Point. A roe test on Febuary 28 indicated a roe yield of 11.3 % and average fish size of 20.7 cm in length. Another test taken on March 2 had a roe yield of 14.0% and fish size of 22.3 cm. This stock estimate did not change and the last day any assessment was carried out was on March 8. It should be noted that there was a reasonably good spawn in the Friendly Cove/McKay pass area so it is assumed that a good body of fish showed up at a later date.

Esperanza Inlet- For the past several years stocks in the Esperanza area have remaind at very low levels and there was no improvement this year. The maximun tonnage sounded was 800 tons and was the lowest hydroacoustic sounding on record. A roe test on Febuary 25 indicated a maturity of 11.3% and average fish size of 21.9 cm. Another roe test on Febuary 28 had a yield of 11.3% and average fish size of 21.1 cm.

Stock assessment continued on a daily basis until spawning occured however no further roe testing was carried out.

AREA 26

While assessment was sporatic in Area 26 this year there was no herring observed when the assessment vessel was in the area. There were no spawnings reported in this area and have been none for several years..

AREA 27

ASSESSMENT

In Klashkish Inlet stock assessment began on Febuary 25 and 1,000 tons were sounded. A roe test indicated a roe maturity of 1% and average fish size of 23.8 cm. Stock estimates remained at this level until March 3 when they were increased to 1,500 tons. This was the maximum tonnage sounded in this location as the assessment vessel left the area on March 7 to assist in the fisheries in Area 24. The highest roe yield tested was 10% on March 4 and the average size of fish was 23.8 cm.

In Winter Harbour, 2,000 tons were sounded on Febuary 24 the first day of assessment and the stocks remained at this level for the remainder of the sounding program. This was the maximun tonnage sounded in this location. The first roe test was made on Febuary 26 and indicated a roe maturity of 0% and average fish size of 21.7 cm. The maximum roe maturity tested this year was 8.5 % on March 6.

SPAWN-ON-KELP

Spawn-on-kelp harvesting has been permitted by regulation in British Columbia since 1975. At present 28 licences are issued on an annual basis to individuals and Native Indian Bands, and each licence authorizes the landing of 16,000 lbs. of product. Landed weights allow for an additional 5% for salt.

Until 1983, a " closed" pond method was used to obtain the product and involved seining sexually mature herring, towing them to a sheltered bay and releasing them into floating pens. These pens are constructed from log frames from which seine web is suspended to form an enclosure. The pond frames are anchored to the bottom and/or tied to the shore. Good quality kelp (Macrocystis integrifolia) is harvested from nearby locations and approximately 2 m. lengths of kelp are tied to weighted lines and suspended in the ponds. Once the herring have spawned on the kelp the product is harvested and sent to processing plants.

In 1982 a study revealed two majors concerns with this type of fishery, (Shields and Kingston,1982.) The first was that a high rate of mortality could occur if the herring were held too long or were over crowded, and the second was that in 12 out of 18 ponds observed, the percentage of female herring that spawned in the impoundement was never greater than 50%. As a result of this study and the concern over the high mortality rate, a new method of harvesting was developed to minimize the problems. This "open" pond method described by Shields and Watson (1983) involves suspending kelp from log frames and towing them through areas where active spawning is in progress. This method has two advantages in that there is no handling of the herring which eliminates injury and/or mortality, and since the herring are spawning in a natural state it is believed that all of the herring spawn.

At present many of the Spawn-on-Kelp operators are using a combination of "open" and "closed" ponds to obtain their quotas.

Management Plans for the Spawn-on-kelp fishery were issued to licence holders in January 1990, (Appendix 3). These plans detail the licencing requirements and inspection guidelines for the 1990 fishery.

Preliminary production figures for 1990 indicate a total of 481,461 lbs. of product were harvested coastwide with an approximate landed value of 8-9 million dollars. This represents an average production of 17,195 lbs. per licence. Any product harvested in excess of the individual quota is relinquished by the fishermen to the Fisheries Department and sold at public auction by crown assets.

The total production for 1990 compares with 459,046 lbs. harvested in 1989, 467,361 lbs. in 1988, and 438,623 lbs. in 1987. The average production coastwide over the past five years is 437,906 lbs.

The distribution of licences and production by area in 1990 was as follows:

Location	No. Licences	Tot. Production
1. Queen Charlotte Islands	11 licences	190,820 lbs.
2. Prince Rupert	8 licences	133,622 lbs.
3. Central Coast	5 licences	87,788 lbs.
4. West Coast Vancouver Isl.	4 licences	69,231 lbs.

1990 HERRING SPAWN SUMMARY

In 1990 a total of 52,668 SAI (Spawn Area Index) of spawn was measured coastwide (Table 12), and compares with the 46,204 SAI recorded in 1989.

Of this total, 39,049 SAI (84%) was measured by divers using SCUBA while the remaining 7,373 SAI was measured using the standard shore based methods. This is an increase from the 72% measured by divers in 1989 and 67% in 1988.

In the North Coast (Areas 1-10) the total spawn recorded was 21,468 SAI (Table 11) and is up considerably from the 14,498 SAI recorded in 1989. Spawnings in the QCI. declined this year, while both the Prince Rupert and Central Coast areas had increases.

In the South Coast (Areas 11-29) the 31,200 SAI recorded was slightly down from the 31,706 measured in 1989 (Table 12).

Individual spawning locations are listed alphabetically by statistical area in Table 13.

The following is a brief summary of spawnings in each District.

Queen Charlotte Islands (Areas 1,2E,2W)

There was no spawn recorded in Area 1 this year and has been none since 1985 when 674 SAI was recorded. Spawnings in this area tend to be small and take place over a long period of time, usually occurring sometime between January and April. This makes it difficult to survey since manpower is limited and Field Staff are concentrating on managing the Roe Herring and Spawn-on-Kelp fisheries that take place during this time. Additionally they tend to concentrate on measuring the major spawns that take place in Areas 2W and 2E.

In Area 2W the total spawn recorded was 3010 SAI, up slightly from the 2,286 SAI recorded in 1989. The greatest increase in spawn occurred in Port Louis which went from 642.5 SAI in 1989 to 2,021 SAI this year. This increase must be qualified somewhat since dive surveys were carried out here for the first time and 90% of the spawn was measured in this way. In Louscoone Inlet spawns declined from 1,076 SAI in 1989 to 415.8 SAI in 1990. The other major spawning on the west coast was in Rennel Sound where 529.3 SAI was measured and is up from the 333.6 SAI recorded in 1989.

In Area 2E all of the spawn was measured by divers and the 5,726 SAI recorded is up from the 3,529 SAI measured in 1989. The major spawning took place in Lower Juan Perez Sound between Scudder Point and Burnaby Strait where 3,981 SAI were recorded. This was up considerably from the 1,831 SAI measured in 1989. The other significant spawning occured in Selwyn Inlet where 1,519 SAI was measured. In Skincuttle Inlet only 137 SAI were recorded and is down from the 730 SAI measured in 1989. There were no spawnings reported in either Atli or Skidegate Inlets this year.

Prince Rupert (Areas 3-5)

In the Prince Rupert area all of the spawns have been measured by divers since 1988. For this year a total of 5,816 SAI was recorded and is up from the 4,129 SAI measured in 1989 but down from the 7,610 SAI recorded in 1988.

In Area 3 only 177 SAI was measured and is a decline from the 514 SAI measured in 1989. All of the spawning took place in Port Simpson (117 SAI) and Stuman Bay (60 SAI).

In Area 4 the total spawn recorded was 5,096 SAI and represents a substantial increase from the 1,969 SAI recorded in 1989. The major spawnings occured at Tree Bluff (2,411 SAI) and in Big Bay (1,932 SAI). There was also some spawning along Burnt Cliff Island (613 SAI) and in Pearl Harbour (204 SAI). A very small spawning of 35 SAI occured in Hunts Inlet.

In Area 5 spawning continues to decline and only 543 SAI of spawn was recorded here this year. This is down from the 1,656 SAI measured in 1989 and 876 SAI recorded in 1988. Most of the spawning occured inside the inlet around Kitkatla Creek and the WIlcox Group with a small spawn of 56 SAI measured in Freemans Pass.

Central Coast (Areas 6-10)

In the Central Coast area a total of 6,916 SAI was recorded and is up from the 4,552 SAI measured in 1989. Of this total 3,729 SAI were measured by divers (54%) while the rest was measured by the shore based method. This compares with 1989 when 53 % of the spawns were measured by divers.

In Area 6 surface surveys were carried out in Kitimat Arm, Thistle Pass and Bishop Bay. A total of 248.9 SAI was recorded and of this 237.6 SAI occured in Kitimat Arm.

Diving surveys took place in Kitasu Bay in the same areas as last year. A total of 1,264.4 SAI was recorded and is down slightly from the 1632.8 SAI measured in 1989. Almost all of the spawning occured inside Kitasu Bay from Wilby Point to Osment Inlet with only 158.8 SAI being recorded on the outside around Abrams Island.

In Area 7 a total of 4,839.2 SAI of spawn was recorded and of this 2,479.5 SAI (50%) was measured by diving surveys and 2,359.7 SAI was measured using surface methods. In 1989 only 32 % of the spawn was measured by divers and may account for the increase in total amount of spawn recorded this year. In 1988, 65% of the spawn was measured by divers and the total spawn in that year was 6,154 SAI.

Surface surveys were carried out around Cecilia Island where 1,355.7 SAI were recorded. This spawn was mainly concentrated around Bend Point. The other major spawns measured by surface surveys were in Spiller Channel(494.7 SAI) and Joassa Channel(150.8 SAI). In the Thompson Bay area both surface and dive surveys were carried out with 208.4 SAI being measured by the surface method and 455.3 SAI measured by divers. These spawnings were located around Princess Alice Island, Houghton Island, Waskesiu Pass, Little Thompson Bay, and Cree Point. There were also diving and surface surveys carried out around Stryker Island were 603.5 SAI were measured by divers and 150.8 SAI measured by surface surveys. The two other major spawns measured by divers were East Higgins Pass (984.0 SAI) and Norman Morrison Bay (346.8 SAI). Both Odin

Cove and Kynumpt Harbour had small spawnigs of 63.5 and 11.9 SAI respectively and were measured by divers.

In Area 8 surface methods were used to measure all spawnings and the 253.7 SAI recorded is below the 306.2 SAI measured in 1988. Most of the spawning occured in Kwakume Inlet(177.5 SAI). An additional 40.66 SAI was observed in Burke Channel and 34.4 SAI measured in Namu.

In Area 9, 302.6 SAI was measured and of this 63.9 SAI was in Kibella Bay and the remaining 238.6 SAI was at the head of Rivers Inlet. The amount of spawn recorded in this area in 1990 was well above the 64.6 SAI recorded in 1988 and the 1985-89 average of 96.2 SAI

In Area 10 only 7.5 SAI was measured and this is down from the 93.7 SAI measured in 1988.

Georgia Strait/Johnstone Strait (Areas 11-20)

Upper East Coast (Area 11-12)

There was no spawn survey carried out in Area 11 this year due to a lack of manpower and vessel availability.

In Area 12 there was a total of 447 SAI of spawn was recorded this year and most of it was occured in Knight Inlet where 247.8 SAI was measured.

The spawning in Knight Inlet took place from Glacier Bay into the head of the inlet with the heaviest concentrations of spawn occuring in Glacier Bay (56.9 SAI) and right at the head of the inlet (83.4 SAI). The rest of the spawn was deposited in a narrow band along both sides of the shoreline.

In addition to the spawning in Knight Inlet there was 100.3 SAI measured in Kingcome Inlet, 87.2 SAI recorded in Wakeman Sound and 11.5 SAI recorded in Fort Rupert (Beaver Harbour). There was also a very small spawn recorded for Clio Channel and this was the first time spawn has been observed in this location since 1981

Middle East Coast (Areas 13-16)

In Area 13 the major spawning took place in Bute Inlet where 25.5 SAI of spawn was recorded. Of this total 15.5 SAI was measured in Bear Bay and 10.0 SAI. in Waddington Harbour.

There was also a very small spawning of 0.74 SAI recorded in Loughbourgh Inlet.

In Area 14 all spawnings were measured by divers and while the 14,055 SAI measured this year was slightly below the 16,041 recorded in 1989 it is still well above the 1985-89 average of 7,895 SAI. The major spawning took place in the traditional area in Lambert Channel along the Hornby/Denman Island shore. A total of 7,945 SAI of spawn was measured here. An additional 3,173 SAI was measured between Cape Lazo and Kye Bay and 2,936 SAI measured along the Qualicum Beach/French Creek shoreline.

In Area 15 only 32 SAI was recorded and all of the spawning occured on Atrevida Reef. This years spawn was down considerably from the 310 SAI recorded in 1989 and the 1985-89 average of 570 SAI. Fisheries field staff working in the area felt that coverage was the same as in past years and that there was no spawn that went unobserved.

There was no spawning in Area 16 this year and has been none since 1987 when 1.9 SAI was measured in Bargin Bay and Porpoise Bay.

Lower East Coast (Areas 17-19)

In Area 17 the 3,994 SAI of spawn measured was well above the 888 SAI recorded in 1989. Most of the spawn occured in a continuous line along the east side of Vancouver Island from Coffin Point to Dodds Narrows. A total of 2,542 SAI was measured in this area. There was an additional 643 SAI measured along west shore of Mudge Island, Link Island and DeCourcy Island, and 808 SAI along the east side of Valdes and Gabriola Islands and around Breakwater Island.

There were no spawnings recorded in either Area 18 or 19 this year although a very light spawning was observed visually in and around Ganges Harbour in Area 18. Spawnings in this area have charactistically been very small and the 1985-89 average is only 12 SAI.

West Coast Vancouver Island (Area 23-27)

Lower West Coast (Area 23-24)

In Area 23 all spawns were measured by divers and have been since 1985. While the 4,796 SAI of spawn recorded this year is down from the 6,092 SAI measured in 1989 it is still above the 1985-89 average of 4,091 SAI. This year the spawn pattern shifted back to normal with all of the spawn being deposited along the Vancouver Island shoreline between Newcombe Channel and Toquart Bay and around the islands in Macoah Pass. Last year most of the spawning took place in the Broken Island group where there had never been any past record of spawning.

In Area 24 both dive and surveys were carried out and a total of 3,739 SAI of spawn was measured. Of this total 2,461 SAI were measured by divers and the remaining 1,277 SAI measured by the surface methods. The dive suveys were carried out on the major spawning locations on Elbow Bank (1067 SAI), Yellow Bank (1,020

SAI) and along the Yarksis Reserve (353 SAI). In Hesquiat Harbour only a limited surface spawn survey was conducted due to manpower constraints. At the time the major spawning occured in Hesquiat all available field staff were involved in the roe herring gillnet and seine fisheries. This was unfortunate because the spawning in Hesquiat was probaply one of the largest seen in that area. In 1989, 2,367 SAI of spawn was measured and it was felt by the local officer that this years spawn was considerably larger.

Upper West Coast (Areas 25-27)

In Area 25 spawnings occured in both Nootka Sound and Esperanza Inlet this year. Surface surveys were carried out in Nootka Sound and 1,046 SAI were measured. The spawn occured in Friendly Cove (249 SAI) and along McKay Passage (321 SAI) as well as around the San Miguel Islands (106 SAI) and in San Gertrudis Cove (139 SAI).

In Esperanza Inlet divers measured 1,070 SAI in Port Langford and around Nuchatlitz, and a further 231 SAI was measured by surface surveys in Port Langford.

While the total spawn deposition in Area 25 this year was almost double the 1,302 recorded in 1989, most of the increase was a result of the large spawning in Nootka Sound. There was no spawn recorded there in 1989 and only 88 SAI in 1988. This area has a history of having very intermittant spawns and quite often a large spawn in one year is followed by several years of no spawn or very little spawn.

There was no spawn observed in Area 26 this year.

In Area 27 diving surveys were carried out in Klashkish Inlet and 365 SAI was recorded. This was down from the 781 SAI measured by divers in 1989. The spawning took place on McDougal Island, Bonner Islets, and in Klashkish Anchorage.

Surface surveys were carried out in Foreward Inlet and 1,629 SAI was measured. This was up slightly from the 1,500 SAI measured by the same methods in 1989.

Fraser River (Area 29)

While there were no spawns measured in the Boundry Bay area this year, the local field staff indicated that a very light spawn did occur.

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TABLE 1 –Distribution of Herring Licences by Roe Herring Area and Gear Type, 1990

Roe Herring Area	Seines	Gillnets
Queen Charlotte Islands 2E	54	72
Queen Charlotte Islands 2W	11	---
Prince Rupert	16	186
Central Coast	59	201
Strait of Georgia	---	373 *
West Coast Vancouver Island	99	122
Total	239 **	954

* Double Licenced Skiffs (required two GN licences to fish this Area)

** Seine total does not include 13 chartered seiners.

TABLE 2 – Roe Herring Quotas (Tons) by Roe Herring Area, 1990

Roe Herring Area	Seines	Gillnets	Total
Queen Charlotte Islands 2E	4000	1000	5000
Queen Charlotte Islands 2W	1102	----	----
Prince Rupert	1700	2137	3837
Central Coast	5300	2918	8218
Strait of Georgia	----	7800	7800
West Coast Vancouver Is. N	6513	1376	7889
Total	18615	15231	33846
Target Catch Division	55%	45%	

TABLE 3 – Hailed Catches (Tons) by Gear and Roe Herring Area, 1990

Roe Herring Area	Seines	Gillnets	Total
Queen Charlotte Islands 2E	5800	1247	7047
Queen Charlotte Islands 2W	1745	----	1745
Prince Rupert	1706	2500	4206
Central Coast	5139	3142	8281
Strait of Georgia	----	8255	8255
West Coast Vancouver Is.	7294	2195	9489
Total	21684	17339	39023
Achieved Catch Division	55.6%	44.4%	

TABLE 4 – Sales Slip Catch Data (Tons) by Roe Herring Area, 1990.

Roe Herring Area		Seines	Gillnets	Total
Queen Charlotte Islands	2E	5787	1290	7077
	2W	2168	-----	2168
Prince Rupert		2224	2588	4812
Central Coast		5336	3357	8693
Strait of Georgia		-----	8690	8690
West Coast Vancouver Is.		7819	2132	9951
	Total	23334	18057	41391

TABLE 5 – Hailed Roe Herring Catch (Tons) Area 1 (Queen Charlotte Islands) by Statistical Area and Gear Type, 1985 – 1990

Hailed Catch (Tons) by Statistical Area

Year	Gear	2E	2W	Total	YEAR TOTAL
1985	SN	4825	----	4825	6383
	GN	1558	----	1558	
1986	SN	3143	----	3143	4067
	GN	924	----	924	
1987	SN	2061	----	2061	2061
	GN	----	----	----	
1988 *	SN	----	----	----	----
	GN	----	----	----	
1989	GN	----	----	----	
	SN	----	1245	1245	1245
1990	GN	1247	----	1247	
	SN	5800	1745	7545	8792

* FISHERY CLOSURE ON QCI DUE TO LACK OF STOCKS

TABLE 6 – Hailed Roe Herring Catch (Tons) Prince Rupert by Statistical Area and Gear Type, 1985 – 1990

Hailed Catch (Tons) by Statistical Area

Year	Gear	3	4	5	Total	Year Total
1985	SN	----	----	3007	3007	6820
	GN	----	3813	----	3813	
1986	SN	----	----	3606	3606	8606
	GN	----	5000	----	5000	
1987	SN	----	----	2118	2118	6587
	GN	(---- 4469---------)		----	4469	
1988	SN	----	----	3800	3800	8829
	GN	(---- 5029---------)		----	5029	
1989	SN	----	----	3541	3541	8813
	GN	(---- 5272---------)		----	5272	
1990	SN	----	----	1706	1706	4206
	GN	(---- 2500---------)		----	2500	

TABLE 7 – Hailed Roe Herring Catch (Tons) Central Coast by Statistical Area and Gear Type, 1985 – 1990

Hailed Catch (Tons) by Statistical Area

Year	Gear	6	7	8	Total	Year Total
1985	SN	----	3045	----	3045	5307
	GN	----	2262	----	2262	
1986	SN	2112	----	----	2112	3207
	GN	(------ 1095-------)		----	1095	
1987	SN	(------ 2673-------)		----	2673	3652
	GN	(------ 979-------)		----	979	
1988	SN	(------ 3583-------)		----	3583	4519
	GN	(------ 936-------)		----	936	
1989	SN	----	6257	----	6257	8953
	GN	(------ 2696-------)		----	2696	
1990	SN	----	5139	----	5139	8281
	GN	(------ 3142-------)		----	3142	

__TABLE 8__ – Hailed Roe Herring Catch (Tons) Strait of Georgia by Statistical Area and Gear Type, 1985 – 1990

Hailed Catch (Tons) by Statistical Area

Year	Gear	14	15	17	Total	YEAR TOTAL
1985	SN	2879	----	----	2879	6565
	GN	3686	----	----	3686	
1986 *	SN	----	----	----	----	----
	GN	----	----	----	----	
1987	SN	----	3432	----	3432	10072
	GN	2417	----	4223	6640	
1988	SN	1715	----	----	1715	8685
	GN	6970	----	----	6970	
1989	SN	1716	----	----	1716	8120
	GN	6404	----	----	6404	
1990	SN	----	----	----	----	8255
	GN	** 8255	----	**	8255	

* FISHERY CLOSED IN STRAIT OF GEORGIA DUE TO LACK OF STOCKS

** COMBINED CATCH FOR AREA 14 AND 17

__TABLE 9__ – Hailed Roe Herring Catch (Tons) West Coast of Vancouver Island by Statistical Area and Gear Type, 1985 – 1990

Hailed Catch (Tons) by Statistical Area

Year	Gear	23	24	25	27	Total	YEAR TOTAL
1985 *	SN	----	----	----	----	----	----
	GN	----	----	----	----	----	
1986 *	SN	----	----	----	----	----	----
	GN	----	----	----	----	----	
1987	SN	15143	----	----	----	15143	17953
	GN	----	----	2810	----	2810	
1988	SN	5700	2690	----	----	8390	9890
	GN	----	1500	----	----	1500	
1989	SN	10091	----	----	----	10091	13783
	GN	3692	----	----	----	3692	
1990	SN	7294	----	----	----	7294	9489
	GN	----	2195	----	----	2195	

* FISHERY CLOSURE ON WCVI DUE TO LACK OF STOCKS

TABLE 10 Landed Weight and Value of British Columbia Roe Herring catches 1980 - 1990 (Sales Slip Data - does not include Roe Herring Charter payment or seized fish)

Year	Landed Weight (tons)	Landed Value * ($ millions)
1980	19,330	23.91
1981	32,087	32.62
1982	29,593	31.58
1983	39,058	46.45
1984	33,379	39.14
1985	25,691	36.35
1986	15,681	39.24
1987	38,790	91.33
1988	30,786	81.00
1989	42,016	57.00
1990	41,391 **	78.00

* Estimated value based on average price paid for seine and gillnet fish

** Preliminary Estimate of landed catch

TABLE 11

SPAWN AREA INDEX (LENGTH *WIDTH * PERCENT COVER * LAYERS) FOR THE NORTHERN COASTAL WATERS OF BRITISH COLUMBIA FROM 1985 TO 1990 BY HERRING SUB-DISTRICT AND STATISTICAL AREA.

	SPAWNING YEARS							
AREA	1985	1986	1987	1988	1989	1990	Average	Years
Queen Charlotte Island								
1	674.1	NS	NS	NS	NS	NS	134.8	1985-88
2E	2639.1	945.6	1455.6	3075.8 *	3529.6 *	5725.8 *	3302.7	1988-89
2W	305.5	158.7	166.5	511.4	2286.3	3010.3 *	685.7	1985-89
Total	3618.7	1104.3	1622.1	3587.2	5815.9	8736.1	4123.2	
Northern								
3	67.5	17.4	554.1	688.3 *	514.1 *	177.2 *	601.2	1988-89
4	7662.5	6246.7	7140.1	6046.5 *	1959.8 *	5095.8 *	4003.2	1988-89
5	2161.5	1252.8	2015.5	875.7 *	1655.6 *	543.1 *	1265.6	1988-89
Total	9891.5	7516.9	9709.7	7610.5	4129.5	5816.1	5870.0	
Upper Central								
6	1054.2	1604.7	1599.8	974.8	1690.6 *	1513.3 *	1308.4	1985-88
Total	1054.2	1604.7	1599.8	974.8	1690.6	1513.3	1308.4	
Lower Central								
7	736.9	1372.7	1431.6	6154.1 *	2397.4 *	4839.2 *	4275.8	1988-89
8	307.5	196.4	442.3	830.2	306.2	253.7	416.5	1985-89
9	24.8	87.2	209.0	95.6	64.6	302.6	96.2	1985-89
10	97.2	350.7	41.4	31.7	93.7	7.5	122.9	1985-89
Total	1166.4	2007.0	2124.3	7111.6	2861.9	5403.0	4911.5	
TOTAL N. COAST	15731	12233	15056	19284	14498	21468		

* Spawn area index based on combined dive and surface survey information.
NOTE: Due to the different methods used in measuring spawns by dive and surface surveys, valid comparisons between the S.A.I. calculated from each type of survey CANNOT be made. In areas where there is a history of dive survey information, averages for those years have been calculated (Asterixed years), and comparisons can be made between those years. Additionally in area where only surface surveys have been carried out averages have also been calculated for comparison.

NS – NO SPAWN SURVEY CARRIED OUT

TABLE 12

SPAWN AREA INDEX (LENGTH *WIDTH * PERCENT COVER * LAYERS) FOR THE SOUTHERN COASTAL WATERS OF BRITISH COLUMBIA FROM 1985 TO 1990 BY HERRING SUB-DISTRICT AND STATISTICAL AREA.

	SPAWNING YEARS							
AREA	1985	1986	1987	1988	1989	1990	Average	Years
Upper East Coast								
11	0.0	16.3	4.9	0.5	0.2	NS	4.4	1985-89
12	251.2	264.2	262.5	828.4	372.5	447.0	395.8	1985-89
Total	251.2	280.5	267.4	828.9	372.7	447.0	400.1	
Middle East Coast								
13	0.1	7.7	61.1	0.0	0.0	26.5	13.8	1985-89
14	3090.8 *	8977.7 *	5861.1 *	5504.2 *	16041.5 *	14054.9 *	7895.1	1985-89
15	551.0	917.6	212.8	860.6	310.3	32.5	570.5	1985-89
16	0.0	0.0	1.9	0.0	0.0	0.0	0.4	1985-89
Total	3641.9	9903.0	6136.9	6364.8	16351.8	14113.9	8479.7	
Lower East Coast								
17	447.1	1373.9	1836.3 *	1709.0 *	888.2 *	3993.6 *	1477.8	1987-89
18	0.0	47.6	0.0	0.0	11.1	NS	11.7	1985-89
19	0.0	0.0	0.0	0.0	132.0	NS	26.4	1985-89
Total	447.1	1421.5	1836.3	1709.0	1031.3	3993.6	1516.0	
Lower West Coast								
23	3066.4 *	4710.1 *	2487.7 *	4098.9 *	6092.2 *	4795.7 *	4091.1	1985-89
24	1746.2	567.0	2561.2 *	4407.1 *	5047.2 *	3738.9 *	4005.2	1987-89
Total	4812.6	5277.1	5048.9	8506.0	11139.5	8534.6	8096.2	
Upper West Coast								
25	436.6	1210.8	1549.1	1510.4	1302.6	2116.4 *	1201.9	1985-89
27	1049.0 .	293.5	890.7 *	1197.4	1500.3 *	1994.5 *	1195.5	1987-89
Total	1485.6	1504.3	2439.8	2707.8	2802.9	4110.8	2397.4	
Southern Mainland								
29	0.0	0.0	0.0	17.1	8.0	NS	5.0	1985-89
Total	0.0	0.0	0.0	17.1	8.0	0.0	5.0	
TOTAL SOUTH COAST	10638	18386	15729	20134	31706	31200		
TOTAL COAST	26369	30619	30785	39418	46204	52668		

* Spawn area index based on combined dive and surface survey information.

NOTE: Due to the different methods used in measuring spawns by dive and surface surveys, valid comparisons between the S.A.I. calculated from each type of survey CANNOT be made. In areas where there is a history of dive survey information, averages for those years have been calculated (Asterixed years), and comparisons can be made between those years. Additionally in area where only surface surveys have been carried out averages have also been calculated for comparison.

NS - NO SPAWN SURVEY CARRIED OUT IN AREA.

Table 13

Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 2W: West Coast Q.C.I.							
Surface Survey							
Alured Point	19/Mar	25/Mar	1310	6	2.50	100	19.65
Inskip Channel	05/Apr	07/Apr	450	9	1.01	60	2.44
Inskip Channel	05/Apr	07/Apr	590	10	1.00	50	2.95
Inskip Channel	05/Apr	07/Apr	1080	6	1.34	30	2.60
Inskip Channel	05/Apr	07/Apr	1260	7	1.00	45	3.97
Inskip Channel	05/Apr	07/Apr	1450	8	1.00	50	5.80
Inskip Channel	05/Apr	07/Apr	1900	11	1.80	50	18.81
Inskip Channel	05/Apr	07/Apr	2160	7	0.63	40	3.78
Inskip Channel	05/Apr	07/Apr	2700	3	1.43	35	4.05
Ogilvie Island	19/Mar	25/Mar	1000	6	25.00	100	150.00
Shields Island	23/Mar	30/Mar	500	50	1.83	75	34.22
Tingley Cove	19/Mar	25/Mar	500	3	0.10	100	0.15
Surface Survey Area Total							248.42

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 2W: West Coast Q.C.I.				Continued			
Dive Survey							
Alured Point	19/Mar	25/Mar	1180	26	2.61	50	40.05
Bottom				26	4.20	50	64.43
Kiokathli Inlet	19/Mar	25/Mar	2930	59	6.17	68	728.01
Bottom				59	1.56	16	43.88
Louscoone Inlet East	06/Apr	08/Apr	6330	82	0.88	47	215.20
Bottom				82	0.85	13	56.07
Macrocystis			2500	55	3.13		45.63
Ogilvie Island	19/Mar	25/Mar	2460	83	4.28	67	586.04
Bottom				83	2.75	11	62.98
Port Louis	19/Mar	25/Mar	4340	26	2.36	70	184.58
Bottom				26	1.00	6	6.46
Queen Island	19/Mar	25/Mar	1610	25	1.50	43	26.16
Bottom				25	4.00	3	5.37
Shields Bay	25/Mar	30/Mar	6140	48	2.45	57	412.40
Bottom				48	1.67	8	40.63
Shields Island	25/Mar	30/Mar	2930	17	1.62	53	42.07
Skindaskun Island	06/Apr	08/Apr	2870	52	0.65	57	55.31
Bottom				52	0.79	31	36.95
Macrocystis			1430	34	2.00		6.65

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 2W: West Coast Q.C.I.				Continued			
Tingley Cove	19/Mar	25/Mar	3120	16	2.21	47	49.66
Bottom				16	3.38	33	53.37
Dive Survey Area Total							2761.90
Statistical Area 2E: East Coast Q.C.I.							
Surface Survey							
Beattie Anchorage	03/Apr	08/Apr	900	6	5.00	90	24.30
Beattie Anchorage	03/Apr	08/Apr	1000	15	2.80	85	35.70
Beattie Anchorage	03/Apr	08/Apr	1100	5	5.00	100	27.50
Surface Survey Area Total							87.50

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 2E: East Coast Q.C.I.				Continued			
Dive Survey							
Alder Island	04/Apr	10/Apr	1400	76	0.81	41	35.58
Macrocystis			1400	51	2.33		12.20
Alder Island Creek	04/Apr	10/Apr	3820	97	2.34	53	456.40
Bottom				97	2.17	3	26.26
Burnaby Strait	04/Apr	10/Apr	5150	69	2.02	59	425.85
Bottom				69	0.56	10	19.99
Huxley Island	04/Apr	10/Apr	9400	71	2.44	41	660.23
Bottom				71	1.56	16	167.60
Macrocystis			4300	57	7.34		211.47
Kilmington Point	08/Apr	10/Apr	4510	68	1.25	44	167.55
Bottom				68	1.28	10	39.60
Macrocystis			4510	16	5.31		121.60
Nakons Islet	04/Apr	10/Apr	1010	70	1.91	43	58.45
Bottom				70	3.00	9	19.44
Poole Inlet	07/Apr	09/Apr	4230	40	1.04	47	81.96
Bottom				40	0.46	22	16.74
Macrocystis			3170	36	1.18		38.39

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 2E: East Coast Q.C.I.				Continued			
Scudder Creek	07/Apr	09/Apr	4150	34	1.52	33	69.04
Bottom				34	1.22	35	59.97
Macrocystis			1040	24	1.25		18.06
Scudder Point	04/Apr	10/Apr	7120	108	1.52	47	556.13
Bottom				108	0.85	46	300.04
Macrocystis			7120	89	1.20		219.67
Section Cove	04/Apr	10/Apr	2230	44	2.25	65	143.07
Bottom				44	0.94	16	15.06
Macrocystis			1260	14	7.50		55.40
Section Island	04/Apr	10/Apr	1960	105	1.63	58	195.08
Bottom				105	0.90	18	32.41
Macrocystis			1960	30	5.00		224.18
Traynor Creek	08/Apr	10/Apr	8830	61	2.86	43	659.02
Bottom				61	2.32	39	488.96
Macrocystis			2500	13	6.88		42.86
Dive Survey Area Total							5638.27

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 03: Nass							
Dive Survey							
Port Simpson	30/Mar	03/Apr	2430	29	3.14	54	116.61
Bottom				29	1.00	1	0.87
Stumaun Bay	30/Mar	03/Apr	1420	29	2.05	66	54.68
Bottom				29	2.00	6	5.06
Dive Survey Area Total							177.22

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 04: Skeena							
Dive Survey							
Big Bay	25/Mar	03/Apr	8250	123	2.43	58	1433.84
Bottom				123	2.50	1	23.26
Burnt Cliff Island	25/Mar	03/Apr	4310	92	2.28	58	528.30
Bottom				92	1.36	16	84.67
Hunt Inlet	30/Mar	04/Apr	3540	9	0.64	41	8.49
Bottom				9	1.00	1	0.30
Macrocystis			2140	25	1.17		3.51
Island Point	30/Mar	04/Apr	1830	15	0.77	45	9.37
Bottom				15	1.33	17	6.21
Macrocystis			1330	8	1.08		7.43
Pearl Harbour	27/Mar	30/Mar	3290	51	1.75	69	201.80
Bottom				51	0.75	2	2.37
Shattock Point	25/Mar	03/Apr	2310	190	1.85	36	289.74
Bottom				190	1.19	16	85.08
Tree Bluff	25/Mar	03/Apr	8720	337	2.36	30	2056.76
Bottom				337	1.06	11	354.67
Dive Survey Area Total							5095.79

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 05: Grenville-Principe							
Dive Survey							
Freeman Passage	10/Apr	15/Apr	2595	16	2.49	44	45.16
Bottom				16	1.65	17	11.33
Kitkatla Creek	05/Apr	12/Apr	8341	71	1.70	40	400.06
Bottom				71	1.86	5	55.62
Wilcox Group	11/Apr	13/Apr	371	57	2.30	58	27.89
Bottom				57	2.00	7	2.99
Dive Survey Area Total							543.06

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 06: Butedale							
Surface Survey							
Bishop Bay	04/May	08/May	4810	4	0.75	70	10.10
Clio Bay	18/Apr	25/Apr	37	2	0.10	100	0.01
Clio Bay	18/Apr	25/Apr	185	10	4.72	100	8.73
Clio Bay	18/Apr	25/Apr	741	5	3.50	100	12.97
Clio Bay	18/Apr	25/Apr	926	5	5.90	100	27.32
Clio Bay	18/Apr	25/Apr	1111	5	1.00	100	5.56
Kitimat	03/Mar	03/Mar	56	40	1.75	100	3.92
Kitimat	18/Apr	25/Apr	556	70	0.30	100	11.68
Kitimat	18/Apr	25/Apr	556	2	0.20	100	0.22
Kitimat	18/Apr	25/Apr	648	1	0.20	100	0.13
Kitimat	18/Apr	25/Apr	926	7	2.10	100	13.61
Kitimat	18/Apr	25/Apr	1111	7	3.96	100	30.80
Kitimat	18/Apr	25/Apr	1296	40	0.75	100	38.88
Kitimat	18/Apr	25/Apr	1852	1	0.10	100	0.19
Thistle Passage	06/Apr	06/Apr	30	3	2.90	70	0.18
Thistle Passage	06/Apr	06/Apr	300	5	1.69	40	1.01
Wathlsto Creek	18/Apr	25/Apr	370	40	0.94	100	13.84
Wathlsto Creek	18/Apr	25/Apr	556	50	2.51	100	69.78
Surface Survey Area Total							248.91

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 06: Butedale			Continued				
Dive Survey							
Abrams Island	28/Mar	31/Mar	2960	37	2.04	61	137.08
Bottom				37	0.99	20	21.77
Jamieson Point	28/Mar	31/Mar	2380	14	1.08	37	13.05
Bottom				14	0.73	37	8.82
Kitasu Bay	28/Mar	31/Mar	6170	23	1.84	42	112.37
Bottom				23	1.50	46	100.05
Macrocystis			5320	18	6.00		208.92
Marvin Islands	28/Mar	31/Mar	2080	32	1.05	38	26.92
Bottom				32	1.15	33	25.41
Macrocystis			2080	18	3.00		13.42
Osment Inlet	28/Mar	31/Mar	2670	20	1.16	28	17.44
Bottom				20	0.88	42	19.51
Macrocystis			2670	20	1.77		13.27
Parsons Anchorage	28/Mar	31/Mar	3970	54	1.24	33	87.85
Bottom				54	1.46	43	135.57
Macrocystis			3970	20	3.33		57.72
Wilby Point	28/Mar	31/Mar	6530	37	1.03	41	102.51
Bottom				37	0.97	37	87.34
Macrocystis			4690	24	1.41		75.40
Dive Survey Area Total							1264.41

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 07: Bella Bella							
Surface Survey							
Bend Pt.	29/Mar	30/Mar	1097	183	6.60	95	1258.71
Berry Inlet	02/Apr	03/Apr	400	2	0.95	70	0.53
Cecilia Island	29/Mar	30/Mar	549	18	2.00	80	15.81
Cecilia Island	29/Mar	30/Mar	549	18	3.25	90	28.90
Cecilia Island	06/Apr	06/Apr	100	4	1.25	50	0.25
Cree Point	04/Apr	05/Apr	200	3	2.50	25	0.38
Cree Point	04/Apr	05/Apr	400	5	1.40	20	0.56
Cree Point	04/Apr	05/Apr	500	5	2.35	30	1.76
Cree Point	04/Apr	05/Apr	600	4	1.95	30	1.40
Don Lagoon +	01/Apr	05/Apr	300	3	8.20	100	7.38
Don Lagoon +	01/Apr	05/Apr	300	5	3.10	50	2.33
Don Lagoon +	01/Apr	05/Apr	300	3	1.85	80	1.33
Don Lagoon +	01/Apr	05/Apr	1000	2	0.70	50	0.70
East Higgins Pass	04/Apr	06/Apr	30	10	0.50	45	0.07
East Higgins Pass	04/Apr	06/Apr	100	3	0.50	25	0.04
East Higgins Pass	04/Apr	06/Apr	100	10	0.30	25	0.08
East Higgins Pass	04/Apr	06/Apr	100	4	0.93	75	0.28
East Higgins Pass	04/Apr	06/Apr	200	4	0.50	75	0.30
East Higgins Pass	04/Apr	06/Apr	200	5	0.50	95	0.48
East Higgins Pass	04/Apr	06/Apr	300	4	0.93	75	0.83

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 07: Bella Bella			Continued				
East Higgins Pass	05/Apr	07/Apr	40	5	0.50	70	0.07
East Higgins Pass	05/Apr	07/Apr	120	10	1.65	80	1.58
Foote Islets	01/Apr	05/Apr	100	40	2.10	50	4.20
Foote Islets	01/Apr	05/Apr	100	5	3.52	100	1.76
Foote Islets	01/Apr	05/Apr	200	5	0.41	30	0.12
Foote Islets	01/Apr	05/Apr	250	3	0.44	70	0.23
Foote Islets	01/Apr	05/Apr	250	3	3.30	100	2.48
Foote Islets	01/Apr	05/Apr	550	4	1.60	95	3.34
Foote Islets	01/Apr	05/Apr	800	5	1.65	60	3.96
Foote Islets	01/Apr	05/Apr	850	3	3.35	95	8.12
Foote Islets	01/Apr	05/Apr	1200	3	1.56	50	2.81
Houghton Islands	04/Apr	07/Apr	25	3	2.56	60	0.12
Houghton Islands	04/Apr	07/Apr	30	10	3.60	90	0.97
Houghton Islands	04/Apr	07/Apr	50	40	3.20	70	4.48
Houghton Islands	04/Apr	07/Apr	100	5	1.57	70	0.55
Houghton Islands	04/Apr	07/Apr	300	4	2.50	30	0.90
Joassa Channel	03/Apr	07/Apr	70	2	2.45	65	0.22
Joassa Channel	03/Apr	07/Apr	100	2	4.55	65	0.59
Joassa Channel	03/Apr	07/Apr	150	3	4.00	80	1.44
Joassa Channel	03/Apr	07/Apr	150	15	6.00	90	12.15
Joassa Channel	03/Apr	07/Apr	160	1	2.30	55	0.20

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date		Length	Width	Layers	Cover	SAI
	Start	End	(m)	(m)		%	
Statistical Area 07: Bella Bella			Continued				
Joassa Channel	03/Apr	07/Apr	200	1	3.00	60	0.36
Joassa Channel	03/Apr	07/Apr	200	3	3.50	90	1.89
Joassa Channel	03/Apr	07/Apr	270	2	4.60	80	1.99
Joassa Channel	03/Apr	07/Apr	300	2	4.50	80	2.16
Joassa Channel	03/Apr	07/Apr	300	1	1.00	60	0.18
Joassa Channel	03/Apr	07/Apr	400	2	2.75	60	1.32
Joassa Channel	03/Apr	07/Apr	800	3	4.20	70	7.06
Joassa Channel	03/Apr	07/Apr	800	3	3.20	75	5.76
Joassa Channel	03/Apr	07/Apr	900	1	2.50	60	1.35
Joassa Channel	03/Apr	07/Apr	1500	10	6.00	80	72.00
Lambard Inlet	02/Apr	04/Apr	100	6	2.80	95	1.60
Little Thompson Bay	03/Apr	04/Apr	30	30	6.25	90	5.06
Little Thompson Bay	03/Apr	04/Apr	130	3	4.20	80	1.31
Little Thompson Bay	03/Apr	04/Apr	130	3	4.00	80	1.25
Little Thompson Bay	03/Apr	04/Apr	250	3	5.00	80	3.00
Little Thompson Bay	03/Apr	04/Apr	250	4	2.75	75	2.06
Louise Channel	02/Apr	05/Apr	60	5	4.20	95	1.20
Louise Channel	02/Apr	05/Apr	100	5	4.85	90	2.18
Louise Channel	02/Apr	05/Apr	150	2	3.75	80	0.90
Neekas Inlet	24/Mar	01/Apr	10	10	10.00	90	0.90
Neekas Inlet	24/Mar	01/Apr	10	10	10.00	90	0.90

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 07: Bella Bella			Continued				
Neekas Inlet	24/Mar	01/Apr	20	10	12.00	100	2.40
Neekas Inlet	24/Mar	01/Apr	20	3	3.55	50	0.11
Neekas Inlet	24/Mar	01/Apr	40	6	5.03	90	1.09
Neekas Inlet	24/Mar	01/Apr	50	15	3.45	60	1.55
Neekas Inlet	24/Mar	01/Apr	50	1	6.00	50	0.15
Neekas Inlet	24/Mar	01/Apr	60	1	1.90	30	0.03
Neekas Inlet	24/Mar	01/Apr	80	2	1.85	50	0.15
Neekas Inlet	24/Mar	01/Apr	100	6	4.43	80	2.12
Neekas Inlet	24/Mar	01/Apr	100	2	2.60	80	0.42
Neekas Inlet	24/Mar	01/Apr	200	150	5.28	70	110.78
Neekas Inlet	24/Mar	01/Apr	600	5	4.70	80	11.28
Neekas Inlet	24/Mar	01/Apr	3700	6	5.50	85	103.79
Norman Morrison Bay	02/Apr	06/Apr	200	3	3.20	90	1.73
Norman Morrison Bay	02/Apr	06/Apr	200	5	3.15	85	2.68
Ormidale Harbour	05/Apr	05/Apr	30	2	1.60	50	0.05
Powell Anchorage	02/Apr	04/Apr	2012	5	0.90	50	4.53
Princess Alice Island	04/Apr	08/Apr	100	3	1.65	70	0.35
Princess Alice Island	04/Apr	08/Apr	200	2	1.70	80	0.54
Princess Alice Island	04/Apr	06/Apr	200	6	2.30	85	2.35
Princess Alice Island	04/Apr	08/Apr	400	2	8.00	90	5.76
Princess Alice Island	04/Apr	08/Apr	800	2	3.25	80	4.16

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 07: Bella Bella			Continued				
Quinoot Point	03/Apr	05/Apr	100	1	3.20	80	0.26
Quinoot Point	03/Apr	05/Apr	100	1	2.60	80	0.21
Quinoot Point	03/Apr	05/Apr	200	2	1.90	60	0.46
Quinoot Point	03/Apr	05/Apr	200	5	2.40	70	1.68
Quinoot Point	03/Apr	05/Apr	300	2	1.60	60	0.58
Quinoot Point	03/Apr	04/Apr	600	50	5.40	95	153.90
Reid Passage	02/Apr	04/Apr	549	5	1.00	90	2.47
Reid Passage	02/Apr	04/Apr	1463	9	2.90	90	34.37
Shingle Rock	01/Apr	05/Apr	30	30	0.10	20	0.02
Shingle Rock	01/Apr	05/Apr	100	6	4.70	100	2.82
Shingle Rock	01/Apr	05/Apr	400	3	4.57	40	2.19
Shingle Rock	01/Apr	05/Apr	550	3	3.50	70	4.04
Spider Anchorage	30/Mar	02/Apr	275	4	3.40	90	3.37
Spider Anchorage	30/Mar	02/Apr	600	8	3.00	90	12.96
Spider Anchorage	30/Mar	02/Apr	2194	2	1.95	85	7.27
Spider Anchorage	30/Mar	02/Apr	2380	2	2.25	85	9.10
Spiller Channel	24/Mar	01/Apr	20	1	3.00	70	0.04
Spiller Channel	24/Mar	01/Apr	25	3	3.75	80	0.23
Spiller Channel	24/Mar	01/Apr	30	2	4.50	80	0.22
Spiller Channel	24/Mar	01/Apr	40	2	3.40	80	0.22
Spiller Channel	24/Mar	01/Apr	70	2	4.00	70	0.39

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 07: Bella Bella			Continued				
Spiller Channel	24/Mar	01/Apr	80	3	2.55	75	0.46
Spiller Channel	24/Mar	01/Apr	100	2	4.20	90	0.76
Spiller Channel	24/Mar	01/Apr	150	3	3.00	60	0.81
Spiller Channel	24/Mar	01/Apr	180	8	8.00	60	6.91
Spiller Channel	24/Mar	01/Apr	180	2	3.75	80	1.08
Spiller Channel	24/Mar	01/Apr	200	2	2.25	80	0.72
Spiller Channel	24/Mar	01/Apr	300	2	2.00	60	0.72
Spiller Channel	24/Mar	01/Apr	300	3	3.85	90	3.12
Spiller Channel	24/Mar	01/Apr	300	3	4.00	90	3.24
Spiller Channel	24/Mar	01/Apr	300	3	6.00	90	4.86
Spiller Channel	24/Mar	01/Apr	360	3	5.50	80	4.75
Spiller Channel	24/Mar	01/Apr	360	5	4.65	80	6.70
Spiller Channel	24/Mar	01/Apr	360	3	5.10	80	4.41
Spiller Channel	24/Mar	01/Apr	400	2	3.70	90	2.66
Spiller Channel	24/Mar	01/Apr	400	2	1.00	30	0.24
Spiller Channel	24/Mar	01/Apr	400	2	2.00	60	0.96
Spiller Channel	24/Mar	01/Apr	540	2	7.40	70	5.59
Spiller Channel	24/Mar	01/Apr	540	4	7.70	70	11.64
Spiller Channel	24/Mar	01/Apr	600	6	3.85	90	12.47
Spiller Channel	24/Mar	01/Apr	600	3	3.35	80	4.82
Spiller Channel	24/Mar	01/Apr	700	3	3.00	40	2.52

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 07: Bella Bella			Continued				
Spiller Channel	24/Mar	01/Apr	720	4	5.70	75	12.31
Spiller Channel	24/Mar	01/Apr	900	2	4.00	80	5.76
Spiller Channel	24/Mar	01/Apr	1000	2	4.20	90	7.56
Spiller Channel	24/Mar	01/Apr	1000	2	5.00	80	8.00
Spiller Channel	24/Mar	01/Apr	1260	3	5.80	90	19.73
Spiller Channel	01/Apr	05/Apr	50	50	4.60	50	5.75
Spiller Channel	01/Apr	05/Apr	200	8	5.00	70	5.60
Spiller Channel	01/Apr	05/Apr	500	5	7.45	100	18.63
Spiller Channel	01/Apr	05/Apr	700	3	3.75	80	6.30
Spiller Channel	01/Apr	05/Apr	1100	8	5.70	100	50.16
Stryker Bay	28/Mar	05/Apr	40	3	1.70	70	0.14
Stryker Bay	28/Mar	05/Apr	80	4	1.00	40	0.13
Stryker Bay	28/Mar	05/Apr	100	4	1.60	90	0.58
Stryker Bay	28/Mar	05/Apr	140	2	0.60	60	0.10
Stryker Bay	28/Mar	05/Apr	150	3	2.25	90	0.91
Stryker Bay	28/Mar	05/Apr	200	80	6.15	95	93.48
Stryker Bay	03/Apr	05/Apr	10	2	1.60	80	0.03
Stryker Bay	03/Apr	05/Apr	20	4	3.10	70	0.17
Stryker Bay	03/Apr	05/Apr	60	25	1.88	65	1.83
Stryker Bay	03/Apr	05/Apr	60	4	1.75	70	0.29
Stryker Bay	03/Apr	05/Apr	90	3	1.40	60	0.23

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 07: Bella Bella			Continued				
Stryker Bay	03/Apr	05/Apr	100	4	2.25	60	0.54
Stryker Bay	03/Apr	05/Apr	110	3	2.40	70	0.55
Stryker Bay	03/Apr	05/Apr	140	2	2.85	85	0.68
Stryker Bay	03/Apr	05/Apr	160	3	1.30	70	0.44
Stryker Bay	03/Apr	05/Apr	540	5	1.70	50	2.30
Stryker Island	02/Apr	05/Apr	30	2	1.65	80	0.08
Stryker Island	02/Apr	05/Apr	40	2	2.00	70	0.11
Stryker Island	02/Apr	05/Apr	170	10	2.03	80	2.75
Stryker Island	02/Apr	05/Apr	230	5	5.40	90	5.59
Stryker Island	02/Apr	05/Apr	400	5	4.65	85	7.91
Stryker Island	02/Apr	05/Apr	1500	5	4.10	90	27.68
Waskesiu Pass	04/Apr	08/Apr	50	20	6.30	60	3.78
Waskesiu Pass	04/Apr	08/Apr	350	20	4.50	25	7.88
Waskesiu Pass	04/Apr	08/Apr	350	8	2.70	20	1.51
Waskesiu Pass	04/Apr	08/Apr	1600	5	0.76	20	1.22
Surface Survey Area Total							2359.74

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 07: Bella Bella			Continued				
Dive Survey							
East Higgins Pass	02/Apr	07/Apr	15500	48	1.46	54	582.86
Bottom				48	1.41	21	221.41
Macrocystis			7500	17	1.99		161.00
East Higgins Pass	02/Apr	07/Apr	1250	47	0.88	59	30.30
Bottom				47	0.64	8	2.96
Houghton Islands	28/Mar	08/Apr	1750	55	2.33	25	55.62
Bottom				55	1.07	8	7.94
Kynumpt Harbour	16/Apr	16/Apr	1470	20	0.96	40	11.18
Bottom				20	0.28	8	0.69
Little Thompson Bay	03/Apr	05/Apr	3100	26	1.79	38	55.84
Bottom				26	1.08	32	28.20
Louise Channel	23/Mar	08/Apr	1750	37	1.46	49	46.14
Bottom				37	0.80	42	21.62
Macrocystis			800	23	4.00		26.60
Norman Morrison Bay	16/Apr	16/Apr	6260	34	2.29	55	268.36
Bottom				34	1.08	34	78.43
Odin Cove	16/Apr	16/Apr	1060	78	1.04	43	36.74
Bottom				78	2.09	16	26.79

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 07: Bella Bella				Continued			
Princess Alice Island	28/Mar	08/Apr	3550	30	2.35	21	51.05
Bottom				30	3.64	67	256.66
Stryker Bay	23/Mar	08/Apr	11150	31	2.40	37	302.44
Bottom				31	1.56	37	195.84
Macrocystis			1000	20	4.50		10.83
Dive Survey Area Total							2479.50

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 08: Bella Coola							
Surface Survey							
Burke Channel	18/Jun	20/Jun	5213	3	2.00	65	20.33
Gaarden Pt.	18/Jun	20/Jun	5212	3	2.00	65	20.33
Kwakume Inlet	29/Mar	02/Apr	100	4	8.60	90	3.10
Kwakume Inlet	29/Mar	02/Apr	120	3	5.70	90	1.85
Kwakume Inlet	29/Mar	02/Apr	850	3	1.38	85	2.98
Kwakume Inlet	29/Mar	02/Apr	920	3	3.90	90	9.69
Kwakume Inlet	29/Mar	02/Apr	1280	3	1.70	90	5.88
Kwakume Inlet	29/Mar	02/Apr	1400	4	2.53	90	12.73
Kwakume Inlet	29/Mar	02/Apr	2140	3	3.50	85	19.10
Kwakume Inlet	29/Mar	02/Apr	2150	3	3.95	90	22.93
Kwakume Inlet	31/Mar	02/Apr	350	50	4.70	85	69.91
Kwakume Inlet	31/Mar	02/Apr	700	2	2.00	90	2.52
Kwakume Inlet	31/Mar	02/Apr	1195	3	4.10	90	13.23
Kwakume Inlet	31/Mar	02/Apr	1245	3	4.05	90	13.61
Namu	01/Apr	01/Apr	400	200	0.86	50	34.40
North Bentinck Arm	26/Mar	26/Mar	1700	2	0.38	60	0.78
North Bentinck Arm	26/Mar	26/Mar	2100	2	0.20	40	0.34
Surface Survey Area Total							253.69

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 09: Rivers Inlet							
Surface Survey							
Kilbella Bay	12/Mar	14/Mar	1100	75	0.70	60	34.80
Kilbella Bay	12/Mar	14/Mar	1500	4	1.00	80	4.80
Kilbella Bay	12/Mar	14/Mar	4500	4	1.59	85	24.33
Rivers Inlet-Head	12/Mar	14/Mar	100	20	2.90	80	4.64
Rivers Inlet-Head	12/Mar	14/Mar	250	150	0.82	50	15.38
Rivers Inlet-Head	12/Mar	14/Mar	450	300	1.57	70	148.37
Rivers Inlet-Head	12/Mar	14/Mar	1100	4	2.20	90	8.71
Rivers Inlet-Head	12/Mar	14/Mar	5150	4	1.66	90	30.78
Rivers Inlet-Head	12/Mar	14/Mar	5150	4	1.66	90	30.78
Surface Survey Area Total							302.57

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 10: Smith Inlet							
Surface Survey							
Anchor Bight	05/Apr	07/Apr	1000	15	0.50	50	3.75
Indian Island	05/Apr	07/Apr	1000	15	0.50	50	3.75
Surface Survey Area Total							7.50
Statistical Area 12: Alert Bay							
Surface Survey							
Ahnuhati Point	06/Apr	07/Apr	39	4	2.43	90	0.34
Ahnuhati Point	06/Apr	07/Apr	41	3	1.95	90	0.22
Ahnuhati Point	06/Apr	07/Apr	78	3	1.95	95	0.43
Ahnuhati Point	06/Apr	07/Apr	86	11	2.43	85	1.95
Ahnuhati Point	06/Apr	07/Apr	184	2	1.50	80	0.44
Ahnuhati Point	06/Apr	07/Apr	224	3	1.95	80	1.05
Ahnuhati Point	06/Apr	07/Apr	697	2	2.43	85	2.87
Axe Point	30/Mar	31/Mar	10	1	0.50	75	0.00
Axe Point	30/Mar	31/Mar	10	1	0.50	75	0.00

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 12: Alert Bay			Continued				
Axe Point	30/Mar	31/Mar	20	1	0.50	80	0.01
Axe Point	30/Mar	31/Mar	50	1	1.00	80	0.04
Axe Point	30/Mar	31/Mar	82	1	1.00	80	0.07
Axe Point	30/Mar	31/Mar	137	1	0.50	80	0.05
Clio Channel	08/Apr	08/Apr	45	2	1.00	95	0.09
Deer Bay	12/Mar	15/Mar	70	7	2.80	85	1.17
Deer Bay	12/Mar	15/Mar	73	21	0.52	80	0.64
Deer Bay	12/Mar	15/Mar	100	4	1.90	80	0.61
Deer Bay	12/Mar	15/Mar	457	3	1.47	85	1.72
Deer Bay	12/Mar	15/Mar	489	5	2.35	80	4.60
Deer Bay	30/Mar	31/Mar	159	1	1.00	80	0.13
Deer Bay	30/Mar	31/Mar	251	4	1.00	80	0.80
Deer Bay	30/Mar	31/Mar	279	2	1.47	80	0.66
Deer Bay	30/Mar	31/Mar	439	2	1.45	85	1.08
Fort Rupert (Beaver Hr.)	05/Apr	05/Apr	800	30	0.80	60	11.52
Glacier Bay +	02/Apr	05/Apr	5	1	0.30	80	0.00
Glacier Bay +	02/Apr	05/Apr	75	2	0.50	80	0.06
Glacier Bay +	02/Apr	05/Apr	103	9	1.90	70	1.23
Glacier Bay +	02/Apr	05/Apr	110	4	4.00	90	1.58
Glacier Bay +	02/Apr	05/Apr	114	3	1.47	80	0.40
Glacier Bay +	02/Apr	05/Apr	115	5	1.90	80	0.87

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 12: Alert Bay			Continued				
Glacier Bay +	02/Apr	05/Apr	139	21	2.80	80	6.54
Glacier Bay +	02/Apr	05/Apr	153	3	1.95	75	0.67
Glacier Bay +	02/Apr	05/Apr	186	5	1.90	80	1.41
Glacier Bay +	02/Apr	05/Apr	191	10	3.25	100	6.21
Glacier Bay +	02/Apr	05/Apr	267	30	1.95	85	13.28
Glacier Bay +	02/Apr	05/Apr	294	3	0.50	80	0.35
Glacier Bay +	02/Apr	05/Apr	312	12	2.35	80	7.04
Glacier Bay +	02/Apr	05/Apr	323	4	2.43	80	2.51
Glacier Bay +	02/Apr	05/Apr	411	6	3.38	85	7.07
Glacier Bay +	02/Apr	05/Apr	420	7	2.90	90	7.67
Hatchet Point	13/Mar	15/Mar	1100	10	2.60	80	22.88
Kingcome Inlet	11/Mar	15/Mar	640	5	4.40	100	14.08
Kingcome Inlet	11/Mar	15/Mar	765	2	1.36	95	1.98
Kingcome Inlet	11/Mar	15/Mar	810	3	1.00	100	2.43
Kingcome Inlet	11/Mar	15/Mar	810	2	1.08	40	0.70
Kingcome Inlet	11/Mar	15/Mar	1042	3	2.30	85	6.11
Kingcome Inlet	11/Mar	15/Mar	1160	4	3.78	100	17.52
Kingcome Inlet	11/Mar	15/Mar	1275	1	0.30	10	0.04
Kingcome Inlet	11/Mar	15/Mar	1506	3	1.80	100	8.13
Kingcome Inlet	11/Mar	15/Mar	1620	3	1.90	85	7.83
Kingcome Inlet	19/Mar	19/Mar	1737	1	1.66	30	0.87

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 12: Alert Bay			Continued				
Kingcome Inlet	19/Mar	19/Mar	1737	2	1.40	50	2.43
Kingcome Inlet	19/Mar	19/Mar	2316	2	1.93	95	8.49
Kingcome Inlet	19/Mar	19/Mar	2316	1	2.58	60	3.58
Kingcome Inlet	19/Mar	19/Mar	2432	1	2.50	80	4.86
Kingcome Inlet	19/Mar	19/Mar	3243	2	2.35	95	14.48
Kingcome Inlet	19/Mar	19/Mar	3475	1	0.73	45	1.13
Kingcome Inlet	27/Mar	28/Mar	200	2	1.41	80	0.45
Kingcome Inlet	27/Mar	28/Mar	920	2	1.14	70	1.47
Kingcome Inlet	27/Mar	28/Mar	920	1	0.83	50	0.38
Kingcome Inlet	27/Mar	28/Mar	1042	1	1.32	50	0.69
Kingcome Inlet	27/Mar	28/Mar	2080	1	0.72	80	1.20
Kingcome Inlet	27/Mar	28/Mar	4860	1	0.62	50	1.49
Knight Inlet	12/Mar	15/Mar	350	10	1.80	90	5.67
Knight Inlet	12/Mar	15/Mar	745	6	2.90	85	11.02
Knight Inlet	12/Mar	15/Mar	2047	4	2.35	70	13.47
Knight Inlet	13/Mar	15/Mar	10	2	1.00	80	0.02
Knight Inlet	13/Mar	15/Mar	30	1	0.60	70	0.01
Knight Inlet	13/Mar	15/Mar	50	1	1.45	50	0.04
Knight Inlet	13/Mar	15/Mar	75	5	1.80	90	0.61
Knight Inlet	13/Mar	15/Mar	100	2	2.20	95	0.42
Knight Inlet	13/Mar	15/Mar	300	1	0.55	70	0.12

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date		Length	Width	Layers	Cover	SAI
	Start	End	(m)	(m)		%	
Statistical Area 12: Alert Bay			Continued				
Knight Inlet	13/Mar	15/Mar	385	4	3.25	95	4.75
Knight Inlet	30/Mar	31/Mar	5	1	1.95	80	0.01
Knight Inlet	30/Mar	31/Mar	10	1	0.50	80	0.00
Knight Inlet	30/Mar	31/Mar	10	3	1.95	80	0.05
Knight Inlet	30/Mar	31/Mar	30	1	1.00	80	0.02
Knight Inlet	30/Mar	31/Mar	60	1	1.00	80	0.05
Knight Inlet	30/Mar	31/Mar	60	1	1.47	80	0.07
Knight Inlet	30/Mar	31/Mar	110	1	1.47	80	0.13
Knight Inlet (Head)	13/Mar	15/Mar	100	3	1.80	70	0.38
Knight Inlet (Head)	13/Mar	15/Mar	1091	9	2.60	80	20.42
Knight Inlet (Head)	13/Mar	15/Mar	1700	4	1.70	80	9.25
Knight Inlet	30/Mar	31/Mar	110	1	1.47	80	0.13
Knight Inlet (Head)	13/Mar	15/Mar	100	3	1.80	70	0.38
Knight Inlet (Head)	13/Mar	15/Mar	1091	9	2.60	80	20.42
Knight Inlet (Head)	13/Mar	15/Mar	1700	4	1.70	80	9.25
Knight Inlet (Head)	01/Apr	03/Apr	107	2	1.00	80	0.17
Knight Inlet (Head)	01/Apr	03/Apr	130	4	1.00	80	0.42
Knight Inlet (Head)	01/Apr	03/Apr	150	4	3.70	95	2.11
Knight Inlet (Head)	01/Apr	03/Apr	250	4	3.25	80	2.60
Knight Inlet (Head)	01/Apr	03/Apr	594	100	1.00	60	35.64
Knight Inlet (Head)	01/Apr	03/Apr	648	2	1.95	70	1.77

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 12: Alert Bay			Continued				
Knight Inlet (Head)	01/Apr	03/Apr	740	2	2.43	80	2.87
Knight Inlet (Head)	01/Apr	03/Apr	833	2	2.80	80	3.73
Knight Inlet (Head)	01/Apr	03/Apr	1110	2	2.43	75	4.04
Wahkash Creek	12/Mar	15/Mar	30	3	1.45	80	0.10
Wahkash Creek	12/Mar	15/Mar	33	4	2.80	90	0.33
Wahkash Creek	12/Mar	15/Mar	90	3	2.35	70	0.44
Wahkash Creek	12/Mar	15/Mar	137	3	1.90	80	0.62
Wahkash Creek	12/Mar	15/Mar	150	3	1.45	70	0.46
Wahkash Creek	12/Mar	15/Mar	170	10	3.70	90	5.66
Wahkash Creek	12/Mar	15/Mar	450	4	1.47	80	2.12
Wahkash Creek	12/Mar	15/Mar	647	2	2.80	80	2.90
Wahkash Creek	13/Mar	15/Mar	75	2	1.38	80	0.17
Wahkash Creek	13/Mar	15/Mar	150	1	1.00	80	0.12
Wahkash Creek	13/Mar	15/Mar	200	4	2.20	90	1.58
Wahkash Creek	13/Mar	15/Mar	200	5	2.80	90	2.52
Wahkash Creek	13/Mar	15/Mar	250	2	1.75	60	0.52
Wahshihlas Bay	13/Mar	15/Mar	650	5	2.13	80	5.53
Wahshihlas Bay	13/Mar	15/Mar	697	6	1.75	85	6.22
Wakeman Sound	11/Mar	15/Mar	670	3	3.50	100	7.04
Wakeman Sound	11/Mar	15/Mar	695	3	2.66	100	5.55
Wakeman Sound	11/Mar	15/Mar	776	10	2.60	85	17.15

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 12: Alert Bay			Continued				
Wakeman Sound	11/Mar	15/Mar	848	3	1.76	70	3.13
Wakeman Sound	11/Mar	15/Mar	925	3	1.21	70	2.35
Wakeman Sound	11/Mar	15/Mar	925	3	2.66	90	6.64
Wakeman Sound	11/Mar	15/Mar	1274	4	1.83	85	7.91
Wakeman Sound	11/Mar	15/Mar	1343	3	1.44	95	5.51
Wakeman Sound	11/Mar	15/Mar	1343	3	0.75	25	0.76
Wakeman Sound	11/Mar	15/Mar	1448	3	2.54	80	8.83
Wakeman Sound	11/Mar	15/Mar	1471	3	1.45	80	5.12
Wakeman Sound	11/Mar	15/Mar	1540	2	0.36	90	1.00
Wakeman Sound	11/Mar	15/Mar	1621	3	1.14	95	5.27
Wakeman Sound	11/Mar	15/Mar	2315	2	2.49	95	10.95
Surface Survey Area Total							446.95

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 13: Quatiaski							
Surface Survey							
Bear Bay	16/Mar	18/Mar	366	5	0.90	80	1.32
Bear Bay	16/Mar	18/Mar	640	3	0.47	90	0.81
Bear Bay	16/Mar	18/Mar	1372	3	0.20	80	0.66
Bear Bay	16/Mar	18/Mar	2743	3	0.91	90	6.75
Bear Bay	16/Mar	18/Mar	4023	4	0.46	80	5.97
Loughborough Inlet	24/Mar	31/Mar	91	3	3.00	90	0.74
Waddington Harbour	18/Mar	18/Mar	732	2	0.50	45	0.33
Waddington Harbour	18/Mar	19/Mar	823	2	0.50	70	0.58
Waddington Harbour	18/Mar	19/Mar	823	2	0.50	70	0.58
Waddington Harbour	18/Mar	18/Mar	1737	9	0.50	40	3.13
Waddington Harbour	18/Mar	18/Mar	4115	2	0.96	65	5.14
Waddington Harbour	19/Mar	19/Mar	366	2	0.50	70	0.26
Surface Survey Area Total							26.25

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 14: Comox							
Dive Survey							
Bowser	11/Mar	14/Mar	4010	102	1.23	52	258.95
Bottom				102	0.69	27	76.46
Boyle Point	07/Mar	09/Mar	1140	34	0.85	48	15.79
Bottom				34	0.60	60	13.99
Cape Lazo	07/Mar	20/Mar	4140	313	2.02	69	1805.69
Bottom				313	1.12	64	932.08
Collishaw Point	04/Mar	10/Mar	5760	189	4.08	49	2164.37
Bottom				189	0.94	19	190.79
Englishman River	22/Mar	24/Mar	4600	112	1.53	34	265.75
Bottom				112	1.00	1	4.76
Fillongley Park	01/Mar	09/Mar	3720	375	1.39	63	1226.41
Bottom				375	1.00	23	315.17
French Creek	22/Mar	24/Mar	4360	212	0.76	39	271.67
Bottom				212	0.34	3	8.17
Kitty Coleman Beach	14/Mar	21/Mar	3080	86	0.93	65	159.71
Bottom				86	0.98	14	34.81
Komas Bluff	05/Mar	09/Mar	7520	328	1.62	31	1232.84
Bottom				328	1.49	30	1094.52
Kye Bay	07/Mar	14/Mar	3110	333	1.11	21	236.77
Bottom				333	0.67	1	4.16

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date		Length	Width	Layers	Cover	SAI
	Start	End	(m)	(m)		%	
Statistical Area 14: Comox			Continued				
Little River	14/Mar	22/Mar	5300	134	1.02	56	406.48
Bottom				134	0.45	14	45.73
Northwest Bay	25/Mar	25/Mar	3400	46	1.47	82	187.21
Bottom				46	0.78	19	23.23
Parksville Bay	21/Mar	24/Mar	3480	87	1.69	50	254.03
Bottom				87	2.40	8	55.35
Qualicum Beach	22/Mar	24/Mar	4500	236	2.07	37	818.00
Bottom				236	1.30	14	195.50
Qualicum River	21/Mar	24/Mar	1280	89	1.17	49	65.12
Sandy Island	06/Mar	09/Mar	2800	456	0.94	27	317.53
Bottom				456	0.88	22	248.30
Tralee Point	04/Mar	09/Mar	2990	34	2.08	17	35.78
Bottom				34	1.00	8	8.39
Whalebone Point	02/Mar	08/Mar	7240	69	2.41	46	550.48
Bottom				69	1.09	33	180.81
Whaling Station Bay	05/Mar	07/Mar	1280	38	1.59	53	40.64
Bottom				38	0.20	20	1.95
Willemar Bluff	10/Mar	14/Mar	3300	77	1.43	50	181.32
Bottom				77	1.05	48	126.18
Dive Survey Area Total							14054.92

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 15: Westview							
Surface Survey							
Atrevida Reef	20/Mar	21/Mar	1100	10	2.95	100	32.45
Surface Survey Area Total							32.45
Statistical Area 17: Nanaimo							
Dive Survey							
Bath Island	15/Mar	23/Mar	750	43	0.36	41	4.77
Bottom				43	1.00	1	0.27
Boat Harbour	15/Mar	23/Mar	3700	48	1.85	47	154.47
Bottom				48	1.44	32	81.26
Breakwater Island	15/Mar	23/Mar	2550	88	1.85	69	286.16
Bottom				88	1.47	31	100.69
Coffin Point (Is.)	15/Mar	23/Mar	5150	108	2.90	38	608.79
Bottom				108	2.55	13	181.25
De Courcy Island	15/Mar	23/Mar	2750	17	1.79	48	38.77
Bottom				17	2.26	21	21.51

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 17: Nanaimo			Continued				
Dodd Narrows South	15/Mar	23/Mar	3650	23	0.81	35	23.84
Gabriola Island South	15/Mar	23/Mar	1450	49	1.09	49	38.09
Bottom				49	0.71	32	16.09
Kulleet Bay	15/Mar	23/Mar	5100	77	1.41	41	226.73
Bottom				77	1.35	7	36.82
Link Island	15/Mar	23/Mar	1300	2	0.70	25	0.46
Bottom				2	0.30	38	0.29
Mudge Island	15/Mar	23/Mar	2560	70	3.67	64	416.68
Bottom				70	3.25	29	165.61
Valdes Island	15/Mar	23/Mar	3650	57	2.40	54	269.64
Bottom				57	1.53	29	92.48
Yellow Point	15/Mar	23/Mar	3700	93	2.34	41	329.64
Bottom				93	1.29	11	49.75
Yellow Pt. (North)	15/Mar	23/Mar	4200	61	4.43	60	673.23
Bottom				61	2.26	31	176.28
Dive Survey Area Total							3993.57

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 23: Barkley Sound							
Dive Survey							
David Island	23/Mar	27/Mar	450	130	2.20	28	36.04
Bottom				130	1.07	37	23.09
Forbes Island	23/Mar	27/Mar	1850	91	2.81	36	168.33
Bottom				91	1.42	41	98.20
Itatsoo Creek	23/Mar	27/Mar	210	50	1.85	59	11.52
Bottom				50	2.36	44	10.97
Macrocystis			15	30	6.00		0.05
Macoah Passage	23/Mar	27/Mar	5000	136	2.28	46	708.58
Bottom				136	1.15	23	178.32
Newcombe Channel	24/Mar	27/Mar	5900	384	1.68	45	1709.63
Bottom				384	1.07	53	1277.68
Ottaway Islet	23/Mar	27/Mar	400	114	1.84	16	13.02
Bottom				114	0.80	32	11.74
Spilling Islet	23/Mar	27/Mar	1300	87	2.69	30	90.60
Bottom				87	1.91	40	87.12
St Ines Island	23/Mar	27/Mar	1200	96	4.21	47	227.56
Bottom				96	2.06	33	76.81
Stopper Islands	23/Mar	27/Mar	850	51	0.92	57	22.63
Bottom				51	1.00	1	0.43

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Toquart Bay	23/Mar	27/Mar	1550	34	0.98	65	33.19
Bottom				34	0.90	22	10.20
Dive Survey Area Total							4795.71
Statistical Area 24: Clayoquot Sound							
Surface Survey							
Antons Spit	02/Mar	04/Mar	60	10	5.00	70	2.10
Antons Spit	02/Mar	05/Mar	80	40	4.00	70	8.96
Antons Spit	02/Mar	04/Mar	150	50	4.60	80	27.60
Antons Spit	04/Mar	04/Mar	100	70	3.00	75	15.75
Antons Spit	04/Mar	04/Mar	300	100	4.50	60	81.00
Beck Island	21/Mar	21/Mar	15	8	0.50	100	0.06
Beck Island	21/Mar	21/Mar	18	16	0.50	100	0.14
Beck Island	21/Mar	21/Mar	50	12	0.30	100	0.18
Beck Island	21/Mar	21/Mar	60	60	0.30	100	1.08
Beck Island	21/Mar	21/Mar	180	18	0.30	100	0.97
Beck Island	21/Mar	21/Mar	200	10	0.30	100	0.60
Calmus Pass	21/Mar	21/Mar	120	35	8.00	70	23.52

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 24: Clayoquot Sound				Continued			
Calmus Pass	21/Mar	21/Mar	182	20	8.00	70	20.38
Chetarpe Reserve	20/Mar	21/Mar	18	3	1.00	100	0.05
Chetarpe Reserve	20/Mar	21/Mar	27	3	2.00	100	0.16
Chetarpe Reserve	20/Mar	21/Mar	36	13	6.00	100	2.81
Chetarpe Reserve	20/Mar	21/Mar	45	3	3.85	100	0.52
Chetarpe Reserve	20/Mar	21/Mar	54	2	2.00	100	0.22
Chetarpe Reserve	20/Mar	21/Mar	182	3	2.00	100	1.09
Epper Pass	08/Mar	09/Mar	15	1	1.00	100	0.02
Epper Pass	08/Mar	09/Mar	15	8	1.00	100	0.12
Epper Pass	08/Mar	09/Mar	20	10	6.00	90	1.08
Epper Pass	08/Mar	09/Mar	20	2	1.00	100	0.04
Epper Pass	08/Mar	09/Mar	20	2	2.00	100	0.08
Epper Pass	08/Mar	09/Mar	25	2	2.00	100	0.10
Epper Pass	08/Mar	09/Mar	25	20	6.00	100	3.00
Epper Pass	08/Mar	09/Mar	25	10	1.00	100	0.25
Epper Pass	08/Mar	09/Mar	30	8	4.00	100	0.96
Epper Pass	08/Mar	09/Mar	30	20	1.00	90	0.54
Epper Pass	08/Mar	09/Mar	40	4	1.00	100	0.16
Epper Pass	08/Mar	09/Mar	60	15	6.00	90	4.86
Epper Pass	08/Mar	09/Mar	65	8	2.00	100	1.04
Epper Pass	08/Mar	09/Mar	120	45	8.00	75	32.40

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 24: Clayoquot Sound				Continued			
Epper Pass	08/Mar	09/Mar	125	10	2.00	100	2.50
Epper Pass	08/Mar	09/Mar	180	90	8.00	85	110.16
Epper Pass	08/Mar	09/Mar	350	90	6.00	85	160.65
Hesquiat Point	02/Mar	05/Mar	500	10	3.30	60	9.90
Hesquiat Point	02/Mar	05/Mar	1000	80	3.50	75	210.00
Kakawis	21/Mar	21/Mar	45	9	1.00	100	0.41
Kakawis	21/Mar	21/Mar	114	64	0.30	100	2.19
Kakawis	21/Mar	21/Mar	182	36	2.00	70	9.17
Maurus Channel	21/Mar	21/Mar	45	1	1.00	100	0.05
Maurus Channel	21/Mar	21/Mar	45	3	1.00	100	0.13
Maurus Channel	21/Mar	21/Mar	45	7	2.00	100	0.63
Maurus Channel	21/Mar	21/Mar	91	2	0.50	100	0.09
Maurus Channel	21/Mar	21/Mar	114	22	0.30	80	0.60
Maurus Channel	21/Mar	21/Mar	114	18	1.50	80	2.46
McIntosh Bay	21/Mar	21/Mar	18	4	2.00	100	0.14
McIntosh Bay	21/Mar	21/Mar	20	2	1.00	100	0.04
McIntosh Bay	21/Mar	21/Mar	22	7	2.00	100	0.31
McIntosh Bay	21/Mar	21/Mar	25	3	2.00	100	0.15
McIntosh Bay	21/Mar	21/Mar	182	55	8.00	90	72.07
Opitsat Reserve	21/Mar	21/Mar	274	6	0.30	100	0.49
Ritchie Bay	21/Mar	21/Mar	8	4	1.00	100	0.03

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 24: Clayoquot Sound				Continued			
Ritchie Bay	21/Mar	21/Mar	9	9	0.50	100	0.04
Ritchie Bay	21/Mar	21/Mar	10	3	4.00	100	0.12
Ritchie Bay	21/Mar	21/Mar	13	13	4.00	100	0.68
Ritchie Bay	21/Mar	21/Mar	20	8	1.50	100	0.24
Ritchie Bay	21/Mar	21/Mar	22	5	1.50	100	0.17
Ritchie Bay	21/Mar	21/Mar	36	5	2.50	100	0.45
Ritchie Bay	21/Mar	21/Mar	36	5	2.00	100	0.36
Ritchie Bay	21/Mar	21/Mar	45	4	2.80	80	0.40
Ritchie Bay	21/Mar	21/Mar	45	1	0.90	100	0.04
Ritchie Bay	21/Mar	21/Mar	45	3	2.00	100	0.27
Ritchie Bay	21/Mar	21/Mar	64	12	0.40	100	0.31
Ritchie Bay	21/Mar	21/Mar	137	2	1.00	100	0.27
Ritchie Bay	21/Mar	21/Mar	274	4	1.00	100	1.10
Robert Point	21/Mar	21/Mar	9	9	3.60	100	0.29
Robert Point	21/Mar	21/Mar	18	9	2.00	100	0.32
Robert Point	21/Mar	21/Mar	18	7	4.00	100	0.50
Robert Point	21/Mar	21/Mar	28	7	4.00	100	0.78
Robert Point	21/Mar	21/Mar	36	18	4.00	100	2.59
Robert Point	21/Mar	21/Mar	55	7	2.00	100	0.77
Robert Point	21/Mar	21/Mar	55	9	4.00	100	1.98
Robert Point	21/Mar	21/Mar	90	18	2.00	100	3.24

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 24: Clayoquot Sound				Continued			
Robert Point	21/Mar	21/Mar	114	14	6.00	100	9.58
Robert Point	21/Mar	21/Mar	137	36	6.00	100	29.59
Roundeault Point	02/Mar	04/Mar	150	15	4.00	100	9.00
Roundeault Point	02/Mar	04/Mar	820	90	3.50	80	206.64
Saranac Island	20/Apr	23/Apr	18	13	8.00	100	1.87
Saranac Island	20/Apr	23/Apr	18	4	3.60	100	0.26
Saranac Island	20/Apr	23/Apr	32	4	5.40	100	0.69
Saranac Island	20/Apr	23/Apr	73	40	6.00	85	14.89
Schindler Pt	21/Mar	21/Mar	365	64	0.30	100	7.01
Stubbs Island	21/Mar	22/Mar	50	30	1.00	100	1.50
Stubbs Island	21/Mar	22/Mar	90	25	2.00	100	4.50
Stubbs Island	21/Mar	22/Mar	110	40	1.00	100	4.40
Stubbs Island	21/Mar	22/Mar	120	22	0.50	80	1.06
Stubbs Island	21/Mar	22/Mar	140	20	2.00	100	5.60
Stubbs Island	21/Mar	22/Mar	150	80	2.00	100	24.00
Stubbs Island	21/Mar	22/Mar	180	100	0.50	100	9.00
Stubbs Island	21/Mar	22/Mar	270	115	1.00	100	31.05
Stubbs Island	21/Mar	22/Mar	365	60	1.50	100	32.85
Stubbs Island	21/Mar	22/Mar	500	350	0.30	100	52.50
Yarksis Reserve	21/Mar	21/Mar	60	10	3.40	100	2.04
Surface Survey Area Total							1276.98

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	 End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 24: Clayoquot Sound				Continued			
Dive Survey							
Elbow Bank	23/Mar	25/Mar	2100	610	1.24	67	1067.02
Saranac Island	23/Mar	25/Mar	600	93	1.17	33	21.49
Yarksis Reserve	23/Mar	25/Mar	3400	264	0.94	42	353.56
Yellow Bank	23/Mar	25/Mar	1650	382	3.26	50	1019.81
Dive Survey Area Total							2461.88

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 25: Nootka Sound							
Surface Survey							
Friendly Cove	22/Mar	28/Mar	330	8	3.93	100	10.37
Friendly Cove	22/Mar	28/Mar	390	160	5.36	70	234.21
Friendly Cove	22/Mar	28/Mar	700	5	1.59	87	4.83
McKay Passage	26/Mar	30/Mar	25	25	2.75	100	1.72
McKay Passage	26/Mar	30/Mar	75	4	1.13	100	0.34
McKay Passage	26/Mar	30/Mar	380	13	2.81	100	13.90
McKay Passage	26/Mar	30/Mar	620	15	3.62	95	31.95
McKay Passage	26/Mar	30/Mar	1300	21	3.68	70	70.31
McKay Passage	26/Mar	30/Mar	1700	17	3.93	100	113.49
McKay Passage	27/Mar	31/Mar	3180	13	2.55	85	89.64
Port Langford	13/Mar	14/Mar	160	50	2.00	40	6.40
Port Langford	13/Mar	14/Mar	560	250	1.80	89	224.53
San Miguel Islands	22/Mar	28/Mar	160	75	3.60	100	43.20
San Miguel Islands	22/Mar	28/Mar	230	80	3.40	100	62.56
Santa Gertrudis Cove	24/Mar	29/Mar	340	16	3.33	73	13.20
Santa Gertrudis Cove	24/Mar	29/Mar	440	130	2.16	73	90.07
Santa Gertrudis Cove	24/Mar	29/Mar	490	11	5.33	69	19.83
Santa Gertrudis Cove	24/Mar	29/Mar	860	9	2.85	71	15.66
Surface Survey Area Total							1046.20

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 25: Nootka Sound			Continued				
Dive Survey							
Inner Nuchatlitz	11/Mar	14/Mar	500	198	0.33	42	13.41
Outer Nuchatlitz	11/Mar	14/Mar	1900	322	0.99	40	241.04
Bottom				322	1.04	23	145.23
Port Langford	11/Mar	14/Mar	2300	162	2.24	42	345.82
Bottom				162	1.15	76	324.67
Dive Survey Area Total							1070.16

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 27: Quatsino Sound							
Surface Survey							
Browning Inlet	21/Mar	21/Mar	100	20	1.45	80	2.32
Forward Inlet	19/Mar	21/Mar	1800	130	4.65	60	652.86
Greenwood Point	19/Mar	21/Mar	700	50	3.15	70	77.18
Hazard Point	19/Mar	21/Mar	250	25	3.90	30	7.31
Hazard Point	19/Mar	21/Mar	920	100	7.70	60	425.04
Hazard Point	19/Mar	21/Mar	1100	20	4.80	80	84.48
Leeson Harbour	21/Mar	21/Mar	75	20	3.00	10	0.45
North Harbour	18/Mar	22/Mar	550	20	6.40	50	35.20
North Harbour	18/Mar	22/Mar	1200	35	3.65	80	122.64
North Harbour	18/Mar	22/Mar	2000	25	5.15	65	167.38
North Harbour	19/Mar	22/Mar	300	20	5.26	30	9.47
North Harbour	19/Mar	22/Mar	850	20	3.90	50	33.15
Quashtin Creek	19/Mar	21/Mar	210	25	3.00	70	11.03
Quashtin Creek	19/Mar	21/Mar	280	20	0.50	30	0.84
Surface Survey Area Total							**1629.34**

Table 13 (con't) Herring Spawn Summary for 1990
Spawn Area Index (SAI)

Spawning Ground	Spawn Date Start	Spawn Date End	Length (m)	Width (m)	Layers	Cover %	SAI
Statistical Area 27: Quatsino Sound				Continued			
Dive Survey							
Bonner Islet	18/Mar	20/Mar	300	70	1.26	56	14.83
Bottom				70	1.50	25	7.88
Klaskish Anchorage	18/Mar	20/Mar	6200	42	1.63	44	186.99
Bottom				42	1.05	28	76.36
McDougal Island	18/Mar	20/Mar	1200	49	1.95	41	46.16
Bottom				49	1.29	42	31.64
Macrocystis			600	15	5.00		1.28
Dive Survey Area Total							365.14

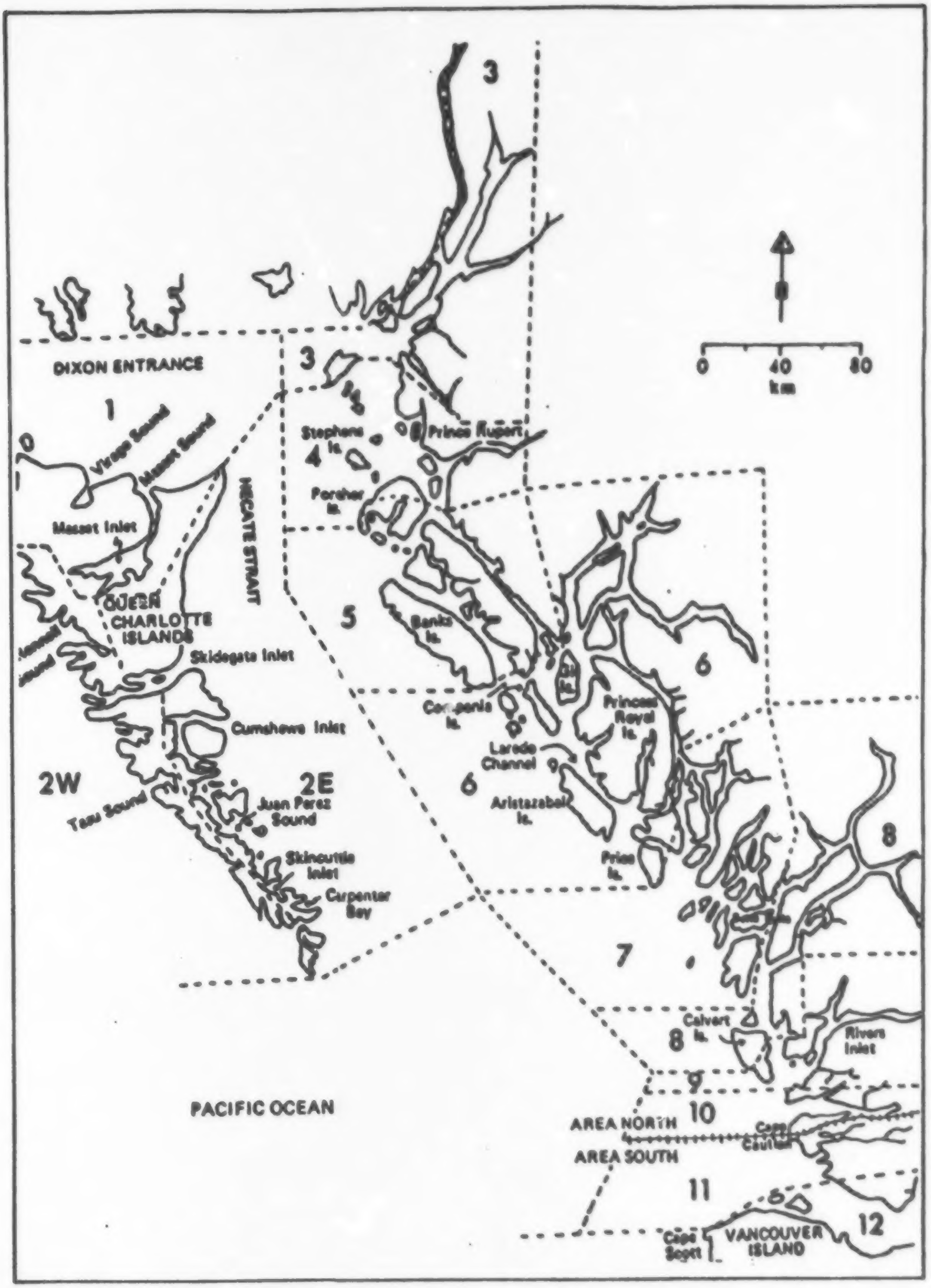


Fig. 1 Location of Stastical Areas in northern B.C.

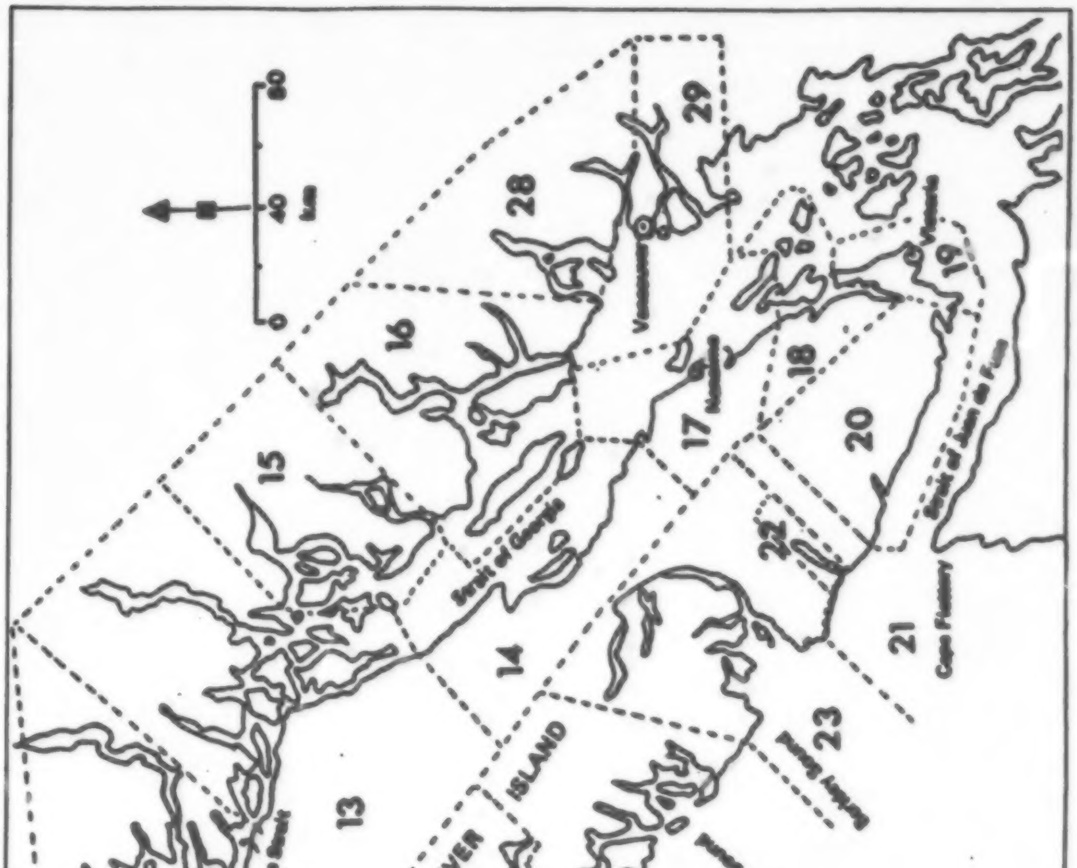


Fig. 2 Location of Stastical Areas in southern B.C.

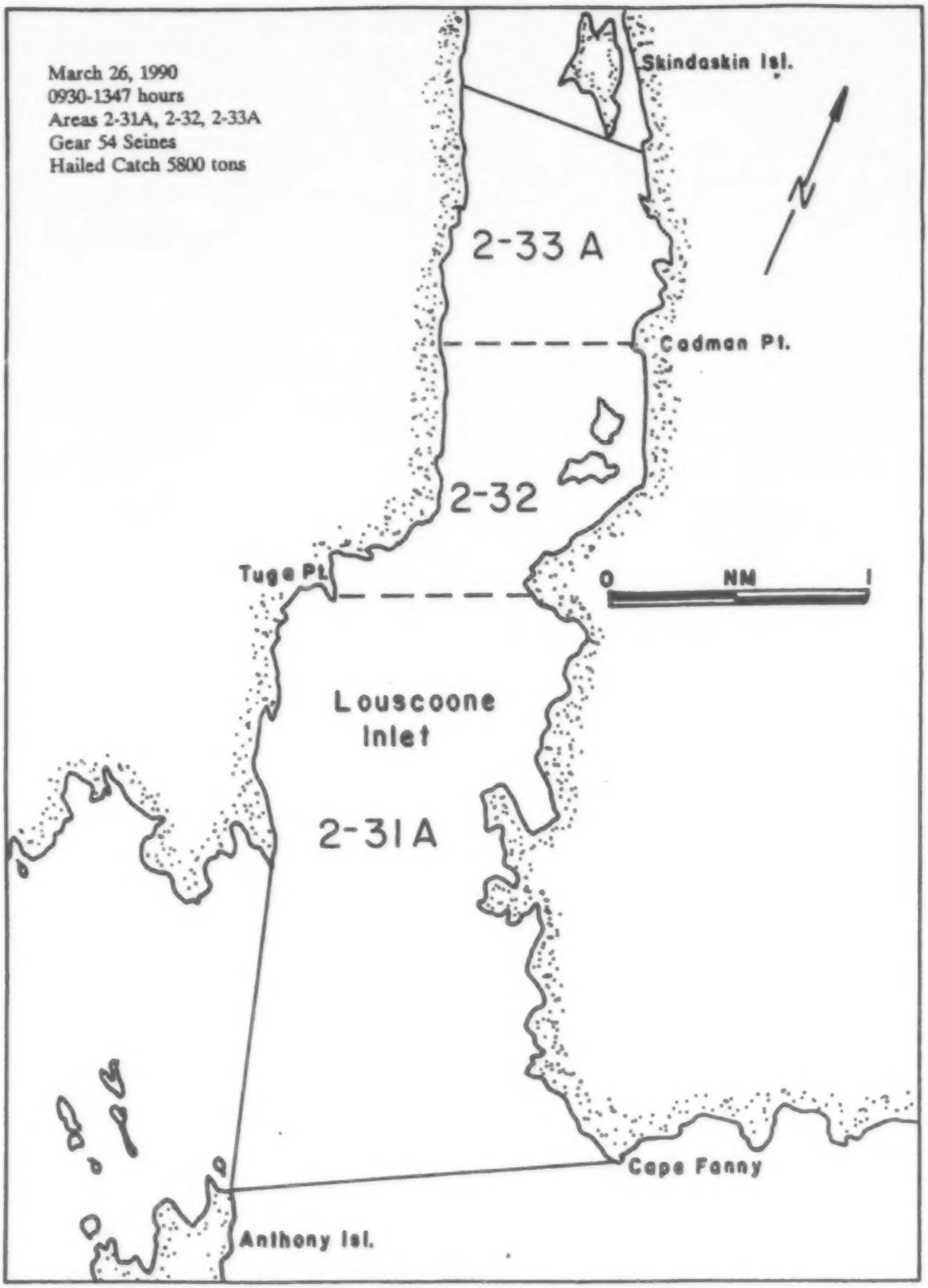
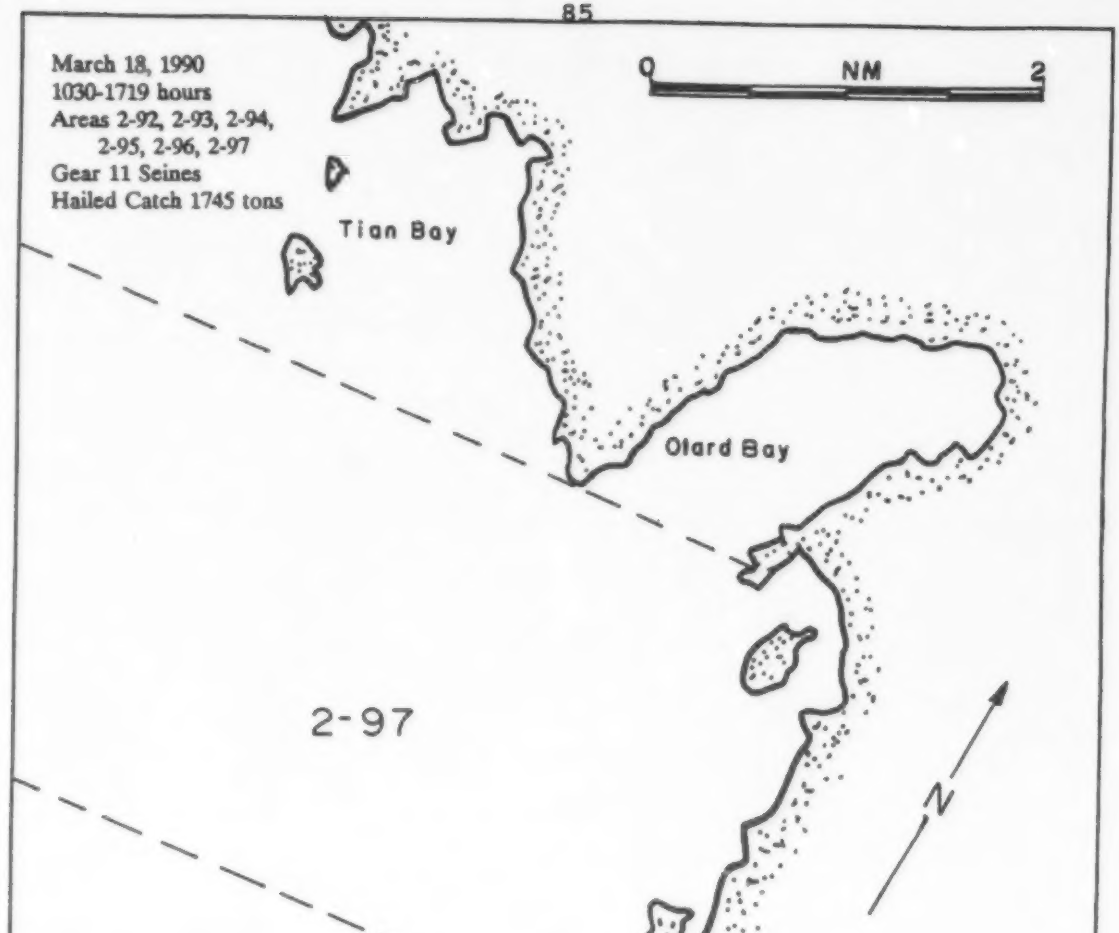


Fig. 3 Roe Herring Seine Fishing Boundries and Hailed Catches by Gear Type in Area 2W, 1990



March 18, 1990
1030-1719 hours
Areas 2-92, 2-93, 2-94,
2-95, 2-96, 2-97
Gear 11 Seines
Hailed Catch 1745 tons

Fig. 4 Roe Herring Seine Fishing Boundries and Hailed Catches by Gear Type in Area 2W, 1990

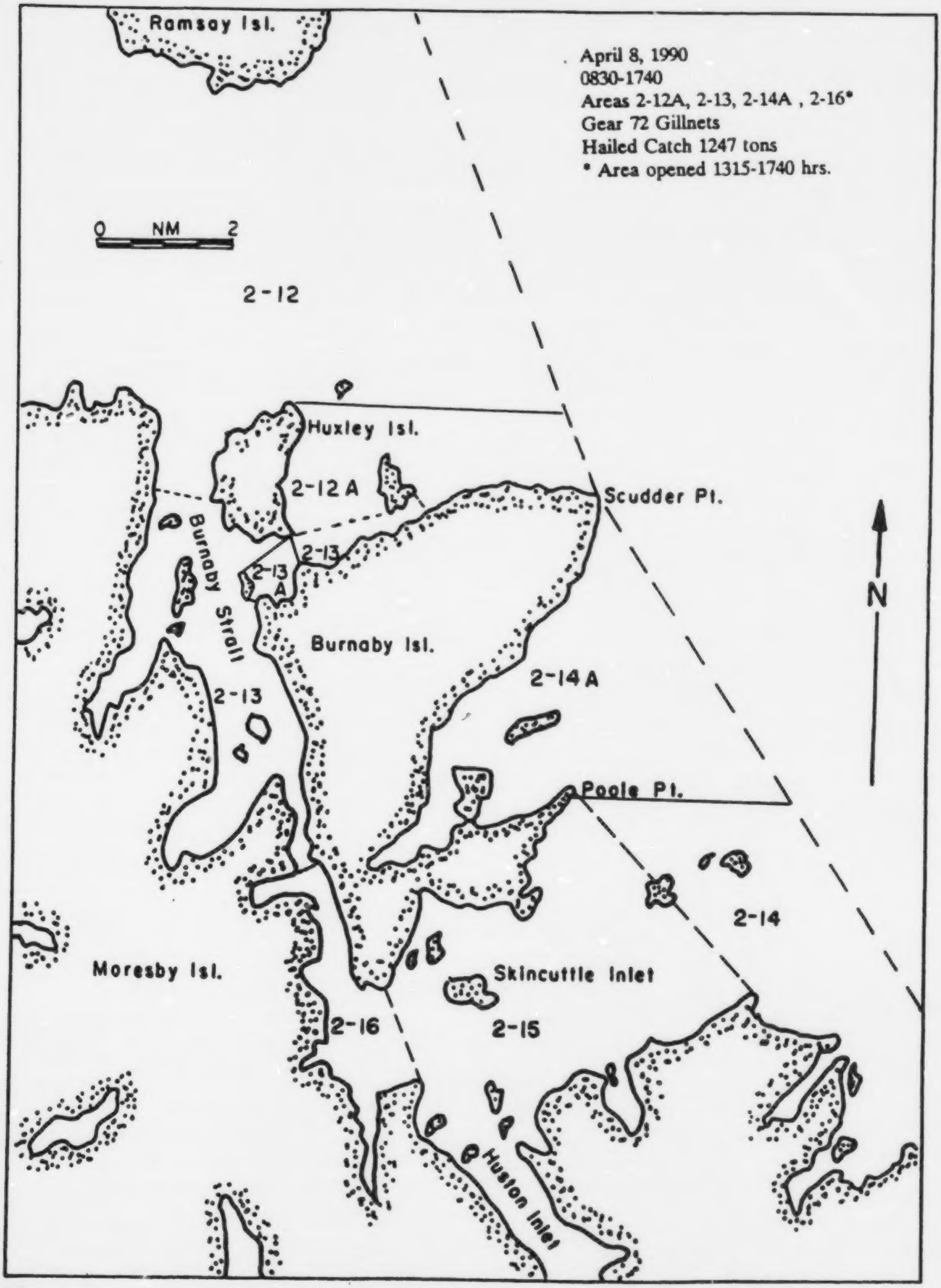
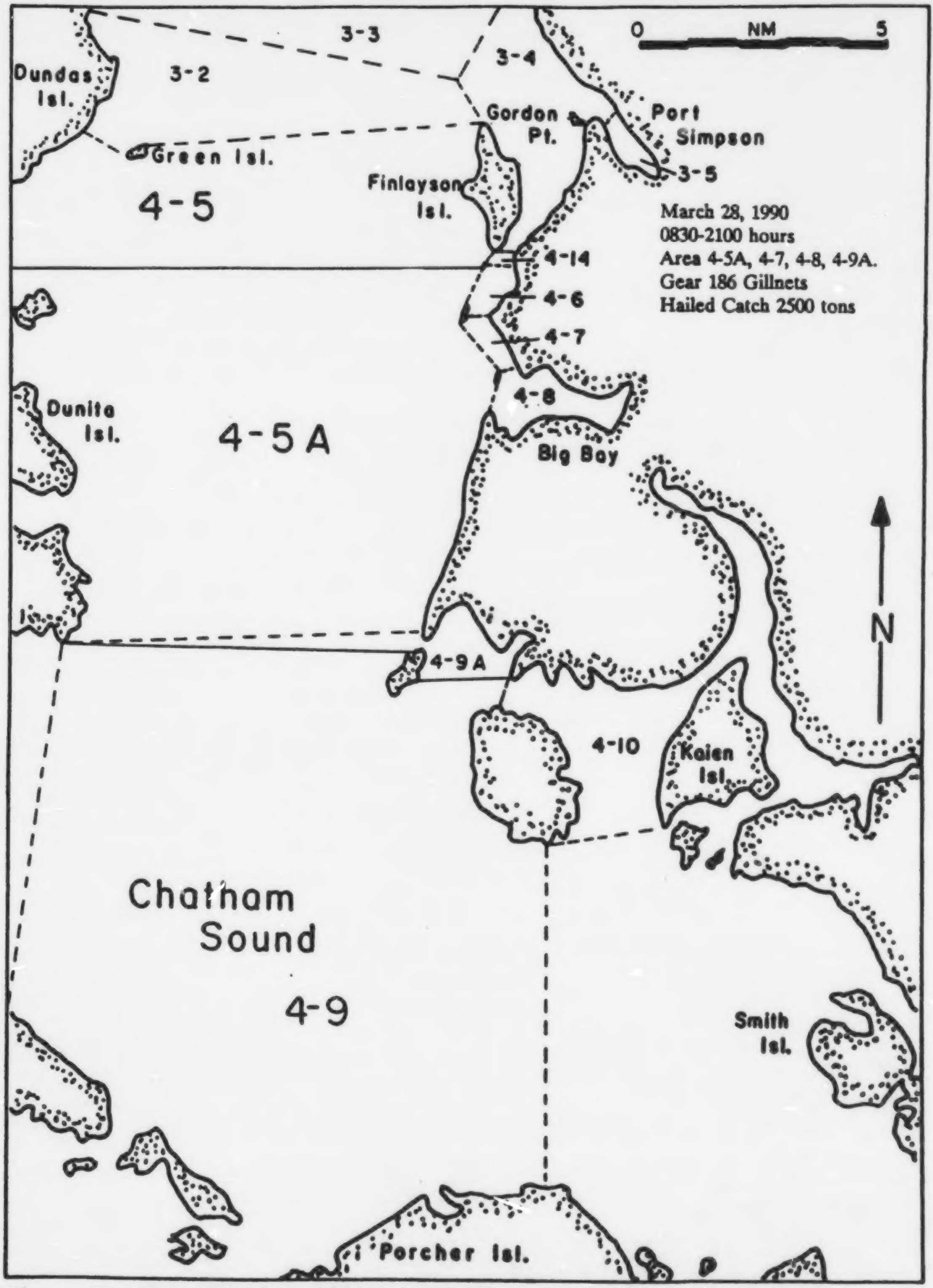
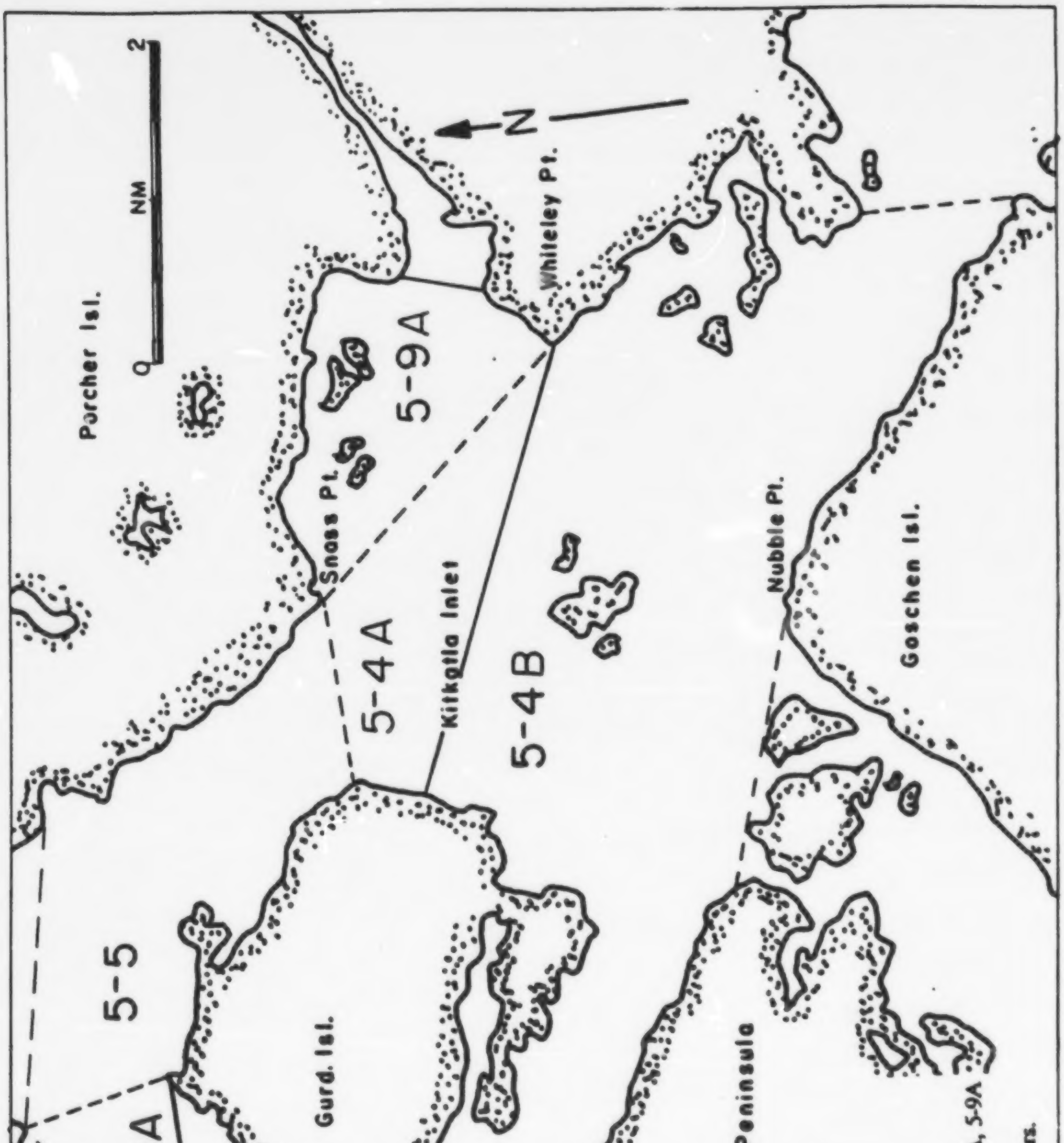


Fig. 5 Roe Herring Gillnet Fishing Boundries and Hailed Catches by Gear Type in Area 2E, 1990



March 28, 1990
0830-2100 hours
Area 4-5A, 4-7, 4-8, 4-9A.
Gear 186 Gillnets
Hailed Catch 2500 tons

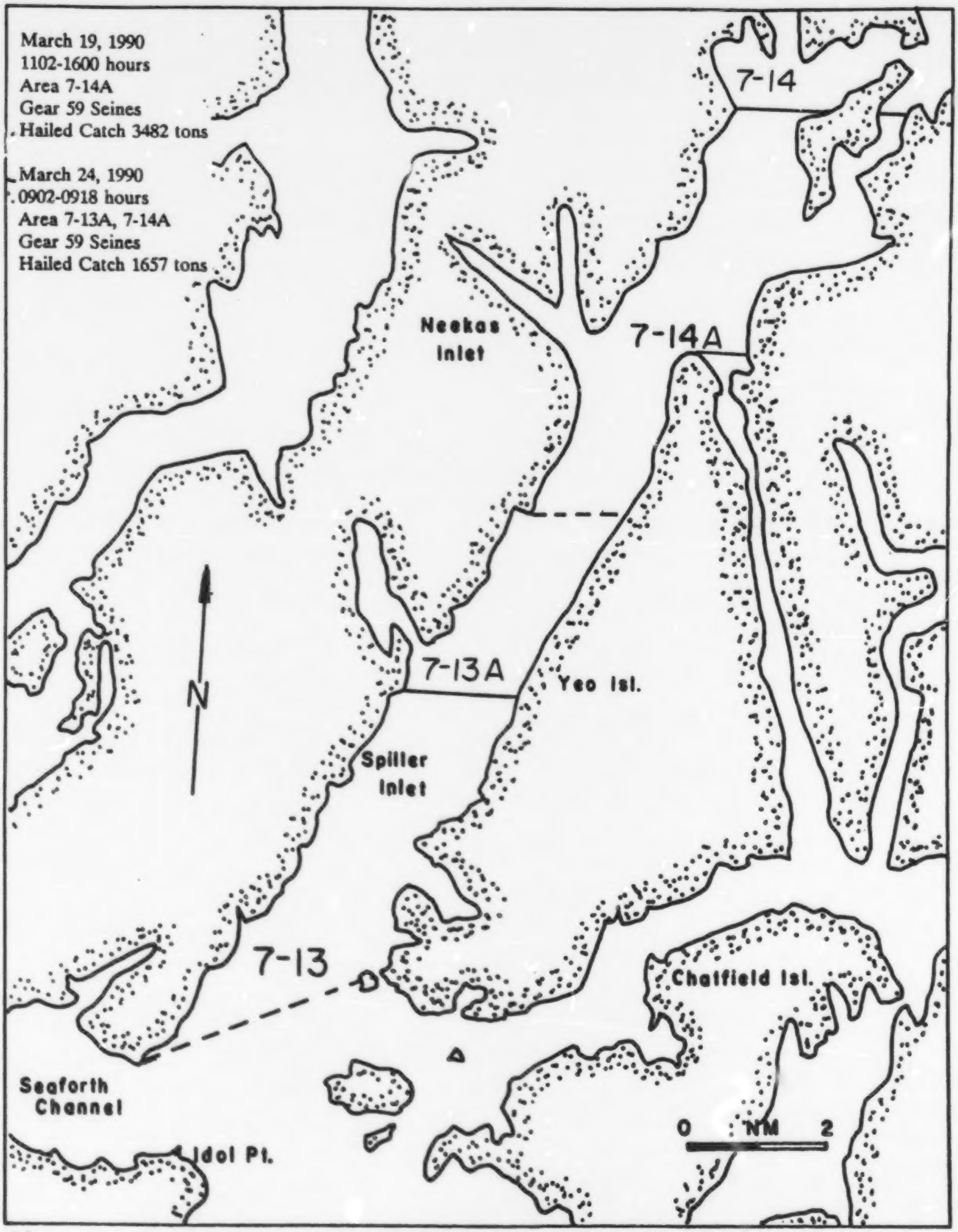
Fig. 6 Roe Herring Gillnet Fishing Boundries and Hailed Catches by Gear Type in Area 3-4, 1990



April 3, 1990
0952-1800 hours
Area 5-4A, 5-5, 5-8A, 5-9A
Gear 16 Seines
Hailed Catch 718 tons

April 4, 1990.
0701-1814 hours
Area 5-4A, 5-4B*, 5-5, 5-8A, 5-9A
Hailed Catch 988 tons
* Area opened 0855-1814 hrs.

Fig. 7 Roe Herring Seine Fishing Boundries and Hailed Catches by Gear Type in Area 5, 1990



March 19, 1990
1102-1600 hours
Area 7-14A
Gear 59 Seines
Hailed Catch 3482 tons

March 24, 1990
0902-0918 hours
Area 7-13A, 7-14A
Gear 59 Seines
Hailed Catch 1657 tons

Fig. 8 Roe Herring Seine Fishing Boundries and Hailed Catches by Gear Type in Area 7, 1990

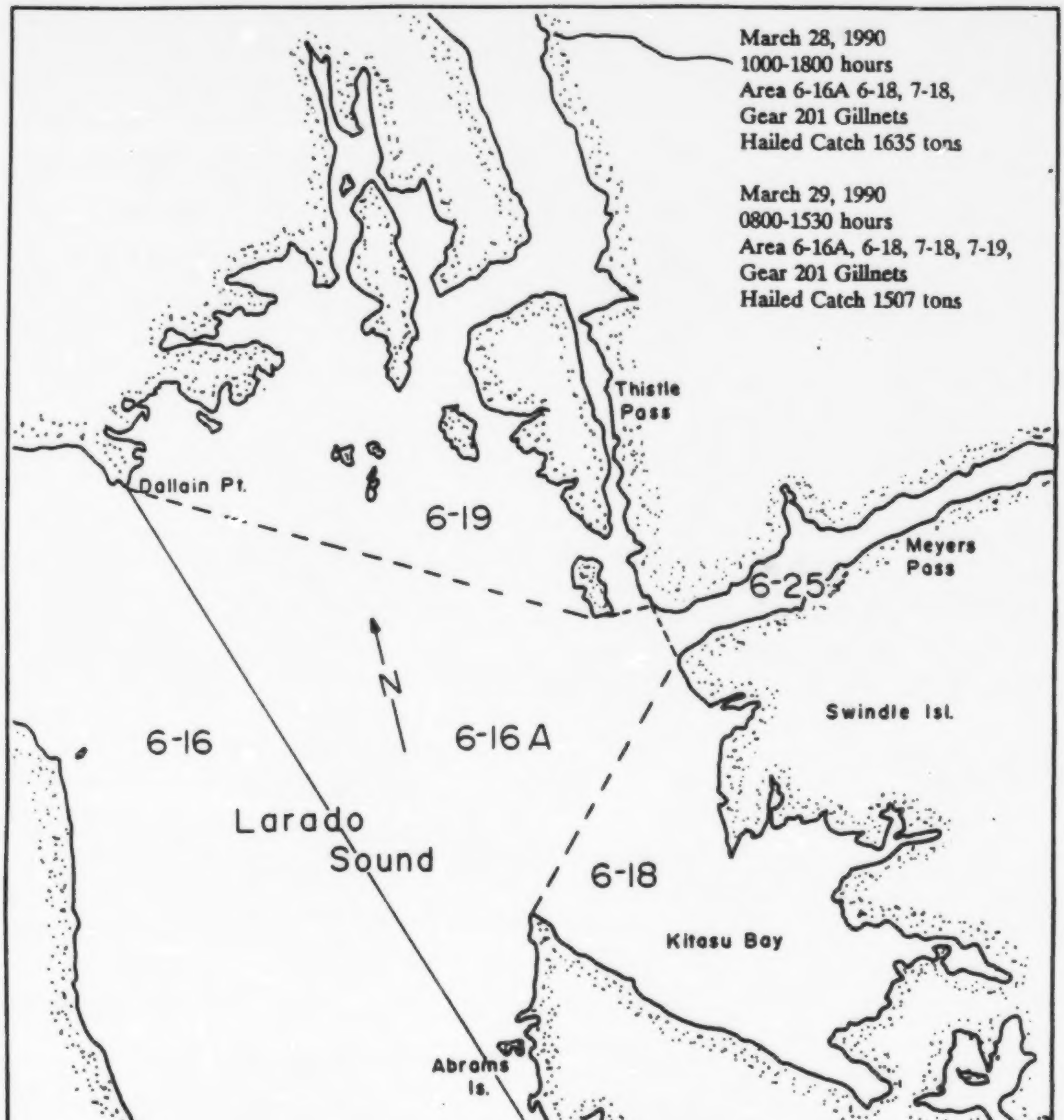


Fig. 9 Roe Herring Gillnet Fishing Boundries and Hailed Catches by Gear Type in Area 6, 1990

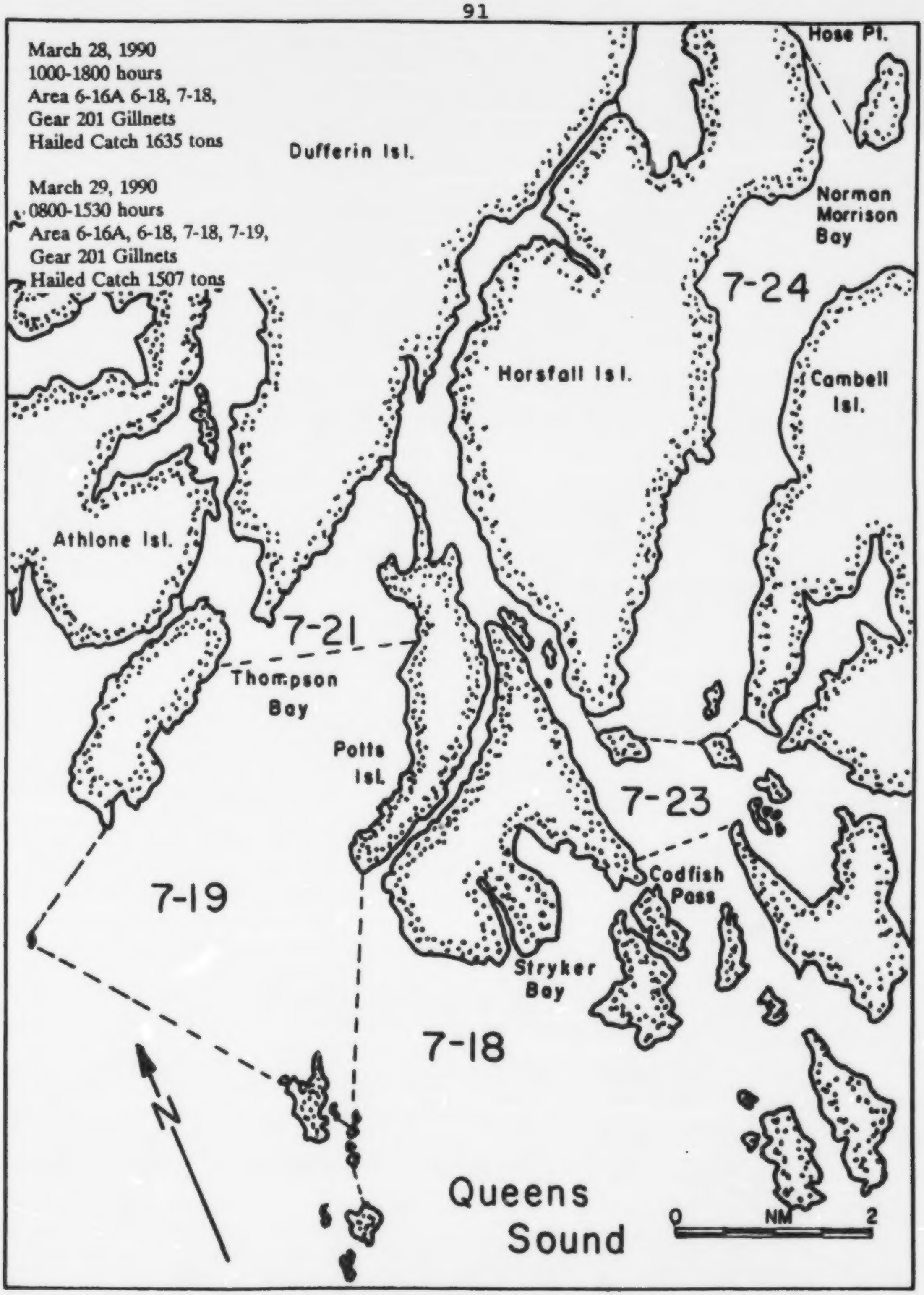
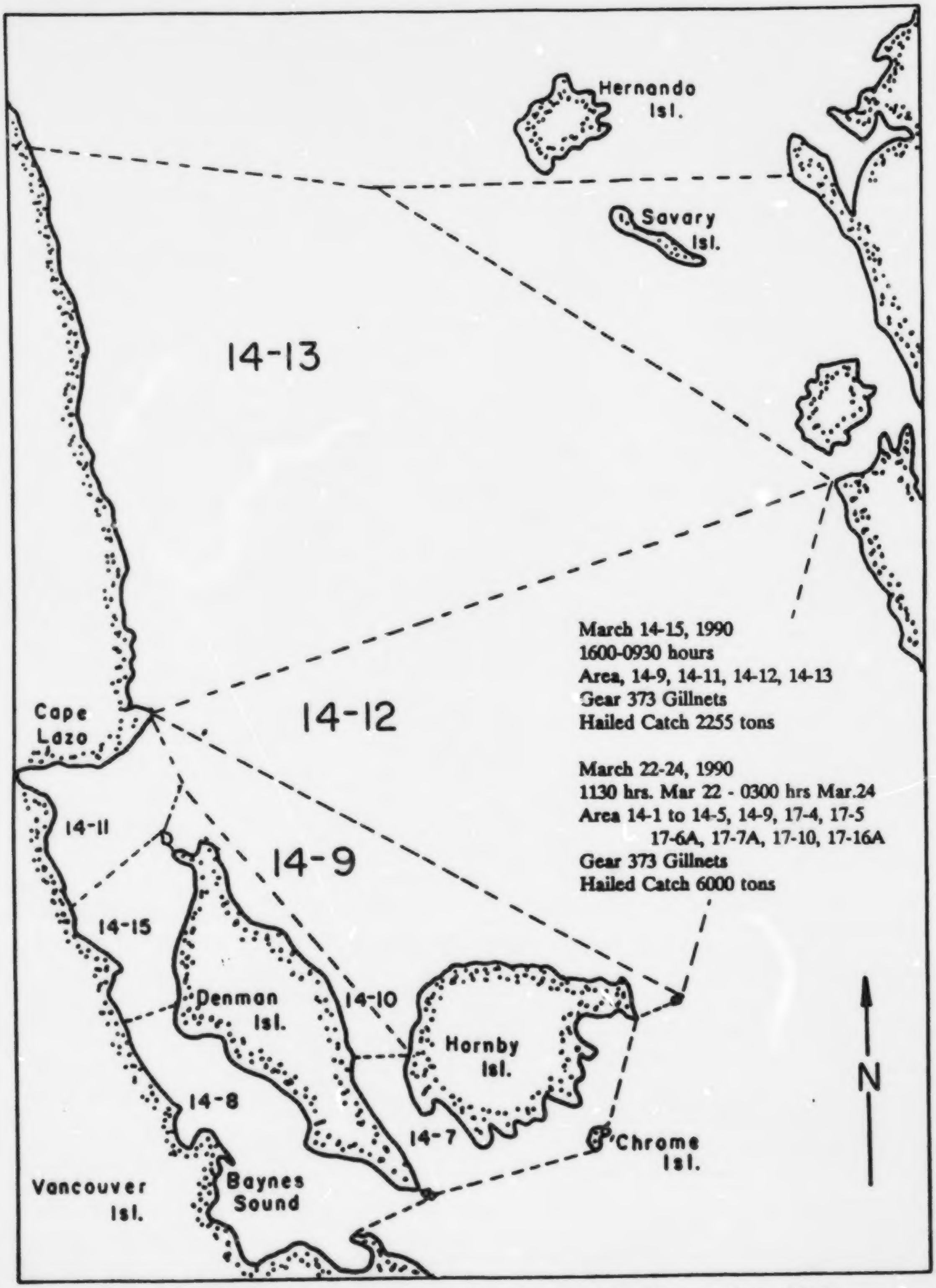


Fig. 10 Roe Herring Gillnet Fishing Boundries and Hailed Catches by Gear Type in Area 7, 1990



March 14-15, 1990
1600-0930 hours
Area, 14-9, 14-11, 14-12, 14-13
Gear 373 Gillnets
Hailed Catch 2255 tons

March 22-24, 1990
1130 hrs. Mar 22 - 0300 hrs Mar.24
Area 14-1 to 14-5, 14-9, 17-4, 17-5
17-6A, 17-7A, 17-10, 17-16A
Gear 373 Gillnets
Hailed Catch 6000 tons

Fig. 11 Roe Herring Gillnet Fishing Boundries and Hailed Catches by Gear Type in Area 14, 1990

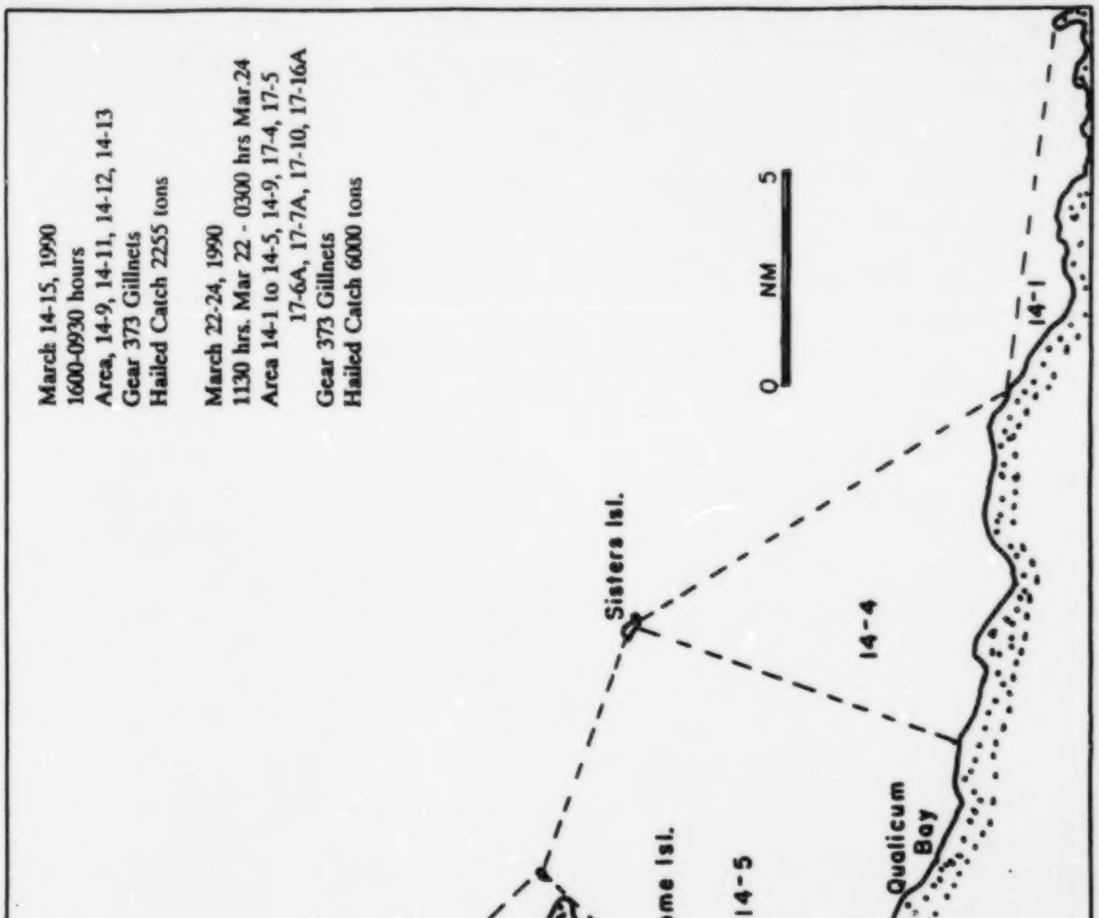
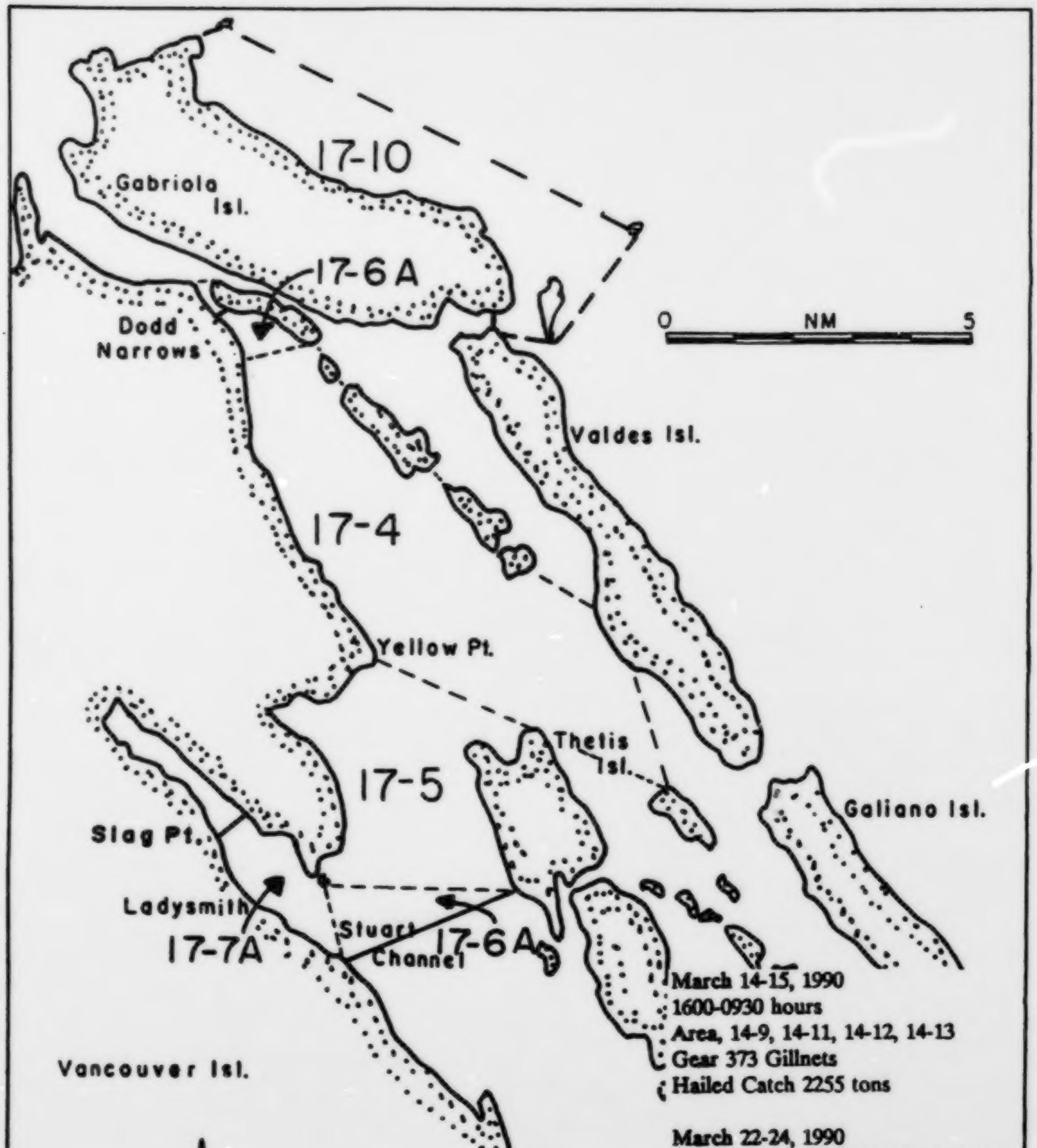


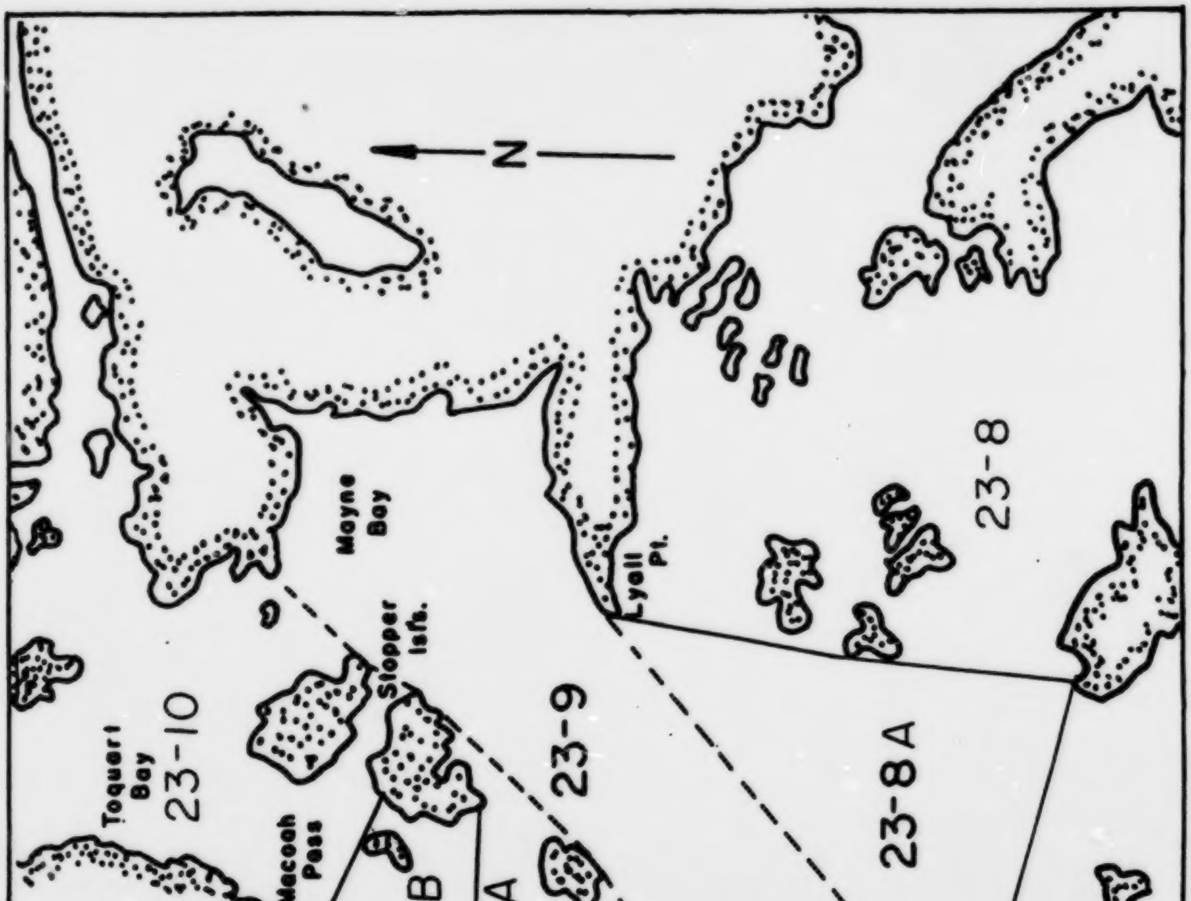
Fig. 12 Roe Herring Gillnet Fishing Boundries and Hailed Catches by Gear Type in Area 14, 1990



March 14-15, 1990
1600-0930 hours
Area, 14-9, 14-11, 14-12, 14-13
Gear 373 Gillnets
Hailed Catch 2255 tons

March 22-24, 1990
1130 hrs. Mar 22 - 0300 hrs Mar.24
Area 14-1 to 14-5, 14-9, 17-4, 17-5
17-6A, 17-7A, 17-10, 17-16A
Gear 373 Gillnets
Hailed Catch 6000 tons

Fig. 13 Roe Herring Gillnet Fishing Boundries and Hailed Catches by Gear Type in Area 17, 1990



March 11, 1990
1001-1500 hours
Area 23-8A, 23-9, 23-10A
Gear 99 Seines
Hailed Catch 3300 tons

March 12, 1990
1000-1452 hours
Area 23-8A, 23-9, 23-10A,
23-10B, 23-11*
Gear 99 Seines
Hailed Catch 3994 tons
* Area opened 1415-1452 hrs.

Fig. 14 Roe Herring Seine Fishing Boundries and Hailed Catches by Gear Type in Area 23, 1990

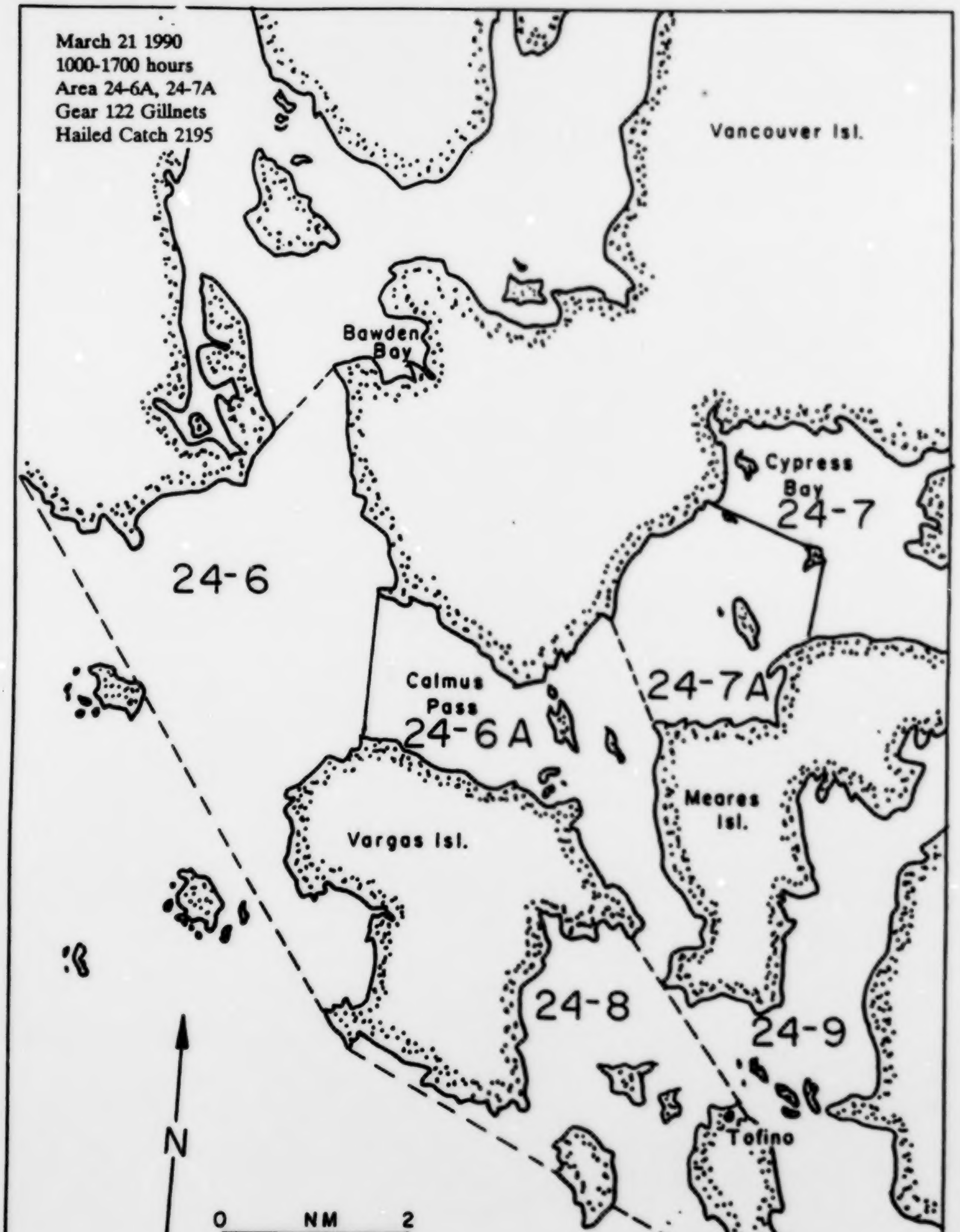


Fig. 15 Roe Herring Gillnet Fishing Boundries and Hailed Catches by Gear Type in Area 24, 1990

Fisheries
and Oceans

Fisheries - Pacific Region
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Pêches - Région du Pacifique
Pièce 400 - 555 rue Hastings ouest
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V6B 5G3

Your file Votre référence

Our file Notre référence

October 4, 1989

Dear Sir/Madam:

The attached "Management Plans for the 1989 Open Herring Food and Bait Fishery" have been reviewed and recommended by the Herring Industry Advisory Board as the best way to implement this small herring fishery given the large number of qualified fishermen.

The lottery entry system has been in place for the previous four seasons and has proven successful in limiting participation in a most fair and equitable way so it has been adopted again for the 1989 season. Catches for the 1989 season have also remained the same at 1200 tons for south coast waters.

For those that are drawn to participate in this fishery, I wish you the best.

Yours truly,

A. Gibson
Chief, Resource Allocation
and Industry Liaison

Canada

OCTOBER 1989

MANAGEMENT PLANS FOR THE 1989 OPEN HERRING FOOD AND BAIT FISHERY

The 1989 Food and Bait fishing season will commence on or after November 13th, in the South Coast and October 29 in the North Coast and terminate on or about December 15th, 1989. Opening dates for specific areas will be as described as a condition of the licence.

MANAGEMENT OBJECTIVES

1. CONSERVATION AND PROTECTION

All Herring caught under the auspices of the Open Food and Bait fishery are accounted for in the overall B.C. Herring Management Plan. Division of catch for every herring fishery is made by Fishery managers so that the catch for each area does not exceed the overall quota for that area. The sum of the catch quotas in each area is approximately 20% of estimated returning adult spawning stock.

2. INTENDED USE OF THE OPEN FOOD AND BAIT FISHERY CATCH

Herring caught in this fishery is intended to provide a small quantity of herring to firms wanting to engage in secondary processing of food herring products and to satisfy to frozen bait requirements of British Columbia commercial fishermen.

3. ECONOMIC VIABILITY

The low quotas in this fishery over the past 9-10 years reflect the low value of herring destined for used as human food or frozen commercial bait. Other fisheries such as roe herring and herring spawn-on-kelp have much higher fishing quotas because the economic returns are much better.

4. PUBLIC HEALTH

Section 12 of the B.C. Fish Inspection Regulations states: "where fresh herring are destined for human consumption, processing, other than by icing or chilling, shall commence within 24 hours of delivery (offloading) at the processing establishment, and shall not be discontinued until the fish has been preserved to a degree which ensures maximum quality of the end product".

5. ENTRY AND LICENCING REQUIREMENTS

NORTH OF CAPE CAUTION

a) A total of 250 tons (150 tons in the Prince Rupert area and 100 tons in the Central Coast) will be allocated to processing companies in the North Coast. Each processor participating will identify one or more boats to fish their allocations.

SOUTH OF CAPE CAUTION

a) A total of 1000 tons will be allocated to fishermen by means of a lottery draw (Lottery form application attached). The 1000 ton allocation will be split between Johnstone Strait and the Strait of Georgia as follows:

  a) Johnstone Strait (Area 13): 100 tons

  b) Strait of Georgia (Area 17 and 18): 900 tons

b) The 1000 tons allocated to the Open Food and Bait Fishery south of Cape Caution will be issued in 50 ton lots. Two vessels will be draw selected to fish the 100 ton allocation in Johnstone Strait and 18 vessels will be draw selected to fish the 900 tons in the Strait of Georgia.

c) Each interested vessel owner may submit an application to fish in only one area. Lottery applications will be accepted at the Prince Rupert and Vancouver Offices, commencing on October 9, 1989 and terminating at 2:00 p.m. on October 20, 1989. The draw will be conducted by an Industry representative on October 23, 1989, in Vancouver, and Industry will be notified of qualifying vessels via telex.

d) Each vessel may be entered on one application only.

6. LICENCING OF VESSELS

Licences for the Food and Bait Herring fishery will be issued in the "Z" category for 1989 with a $50.00 licence fee. "Z" applications need only be submitted by vessel owners who are successful in the lottery draw and the following requirements apply.

a) The vessel or owner must licence for 1989 in one of the "A" seine, "H" or "T" licence categories.

b) Vessels catching or transporting herring during the fishery may require inspection of the fish hold and refrigeration systems prior to issuance of the licence. A properly functioning chilled sea water (C.S.W.) or refrigerated sea water (R.S.W.) system is required for all vessels participating in the fishery.

c) Licence conditions will include:

  i) 50 ton quota per licence.

  ii) Catch and hail reporting requirements.

iii) Seine vessels must have the herring seine on the drum prior to the fishery opening. This may help reduce the incidence of large sets (exceeding the 50 ton quota).

d) Licences are non-transferable.

7. ADMINISTRATION AND REGULATION OF THE FISHERY

a) A herring purse seine must not exceed 500 m (275 fathoms) in length and the mesh size shall not be less than 25 mm (1") extension measure.

b) Areas may be closed in the event that small, damaged or unsuitable fish are being spilled, or if substantial incidental catches of salmon occur.

c) No vessel will be licenced to catch, have on board, or deliver more than 50 tons of herring. In the event more than 50 tons are delivered, a relinquishment (form attached) of the excess herring will be made by the fishermen/licence holder directly to the Crown.

d) Vessels must hail catch tonnage that is taken aboard to a designated patrol vessel prior to leaving the fishing grounds. Destination (plant name and location) and time of arrival at the plant must be given to the designated patrol vessel/officer.

e) All deliveries must be offloaded within 18 hours of capture. The onus is on the vessel master to clear with the plants for reserved offloading.

f) Loads will be subject to consistent monitoring for quality. Failure to comply with any of the conditions of the licence may result in cancellation of the licence and possible cancellation of other future fishing privileges.

g) Seizure of catch, fishing vessel, and fishing gear, may occur if it is found that any of the following conditions of the Food and Bait Fishing Licence, issued under the Pacific Herring Fishery Regulations [Section 18 (2)] are violated:

- i) The commencement and termination dates;
- ii) the location of the fishery;
- iii) the identity of the fishing vessel;
- iv) the type of gear to be used;
- v) the quantity of fish that may be caught, held on board, and delivered; and,
- vi) the means of handling and storing the catch.

h) The mesh size of a trawl net cod end should not be less than 25 mm (1") extension measure.

ATTACHMENT

DEPARTMENT OF FISHERIES AND OCEANS

FILE

RELINQUISHMENT OF CLAIM

NAME:	ADDRESS:	PROVINCE:	TELEPHONE:

BY THESE PRESENTS, ON MY BEHALF OR ON THE BEHALF OF MY HEIRS, EXECUTORS OR ADMINISTRATOR RELEASE FOREVER THE GOVERNMENT OF CANADA AND THE DEPARTMENT OF FISHERIES AND OCEANS FROM ALL MANNER OF ACTIONS, CLAIMS, SUITS OR DEMANDS IN ANY WAY AND DECLARE BEING FULLY SATISFIED WITH THE ACTION TAKEN AND THE SETTLEMENT OF THE FOLLOWING:

DESCRIPTION

Witness

Date

Signature

Date

APPLICATION OCTOBER 1989

1989 OPEN HERRING FOOD AND BAIT FISHERY

BOAT QUOTA LOTTERY SYSTEM

I, ______________________________, the owner/operator of the herring fishing vessel _____ ________________, type of Licence (ie. "A"' "H" or "T") ____________________and CFV #____________, submit application to enter the 1989 Herring Food Bait 50 ton quota lottery system. My vessel has a functional R.S.W. ☐ C.S.W. ☐ refrigeration system.

ENTRY DETAILS

1. Food & Bait fishing licences will be issued to 20 vessels in the 1989 Fishery;

   18 vessels will be allotted 50 ton quotas to be taken in the Strait of Georgia (Areas 17 & 18) and 2 vessels will be allocated 50 tons to be taken in Johnstone Strait (Area 13).

2. All entries must be received at the Vancouver or Prince Rupert office no later than 2:00 p.m. on October 20, 1989.

3. Licences for this fishery are non-transferable between vessels.

4. Each applicant must meet the following entry criteria:

   a) Each applicant must have a valid "A" seine, "T" or "H" seine licence.
   b) All vessels must have and use functioning R.S.W. or C.S.W. systems.
   c) Each vessel may only be entered once, therefore;

   Check one box only:

   A. Johnstone Strait ☐ (2 boats to be chosen)

   B. Strait of Georgia ☐ (18 boats to be chosen)

   d) All seine nets must be on the drum prior to fishing. It is hoped that this will reduce the incidence of large sets.

SIGNED:____________________

DATED:____________________

pc10-0068/4 Bait.wp 89/08/23

Fisheries
and Oceans

Fisheries - Pacific Region
Suite 400 - 555 West Hastings St.
Vancouver, B.C.
V6B 5G3

Pêches - Région du Pacifique
Pièce 400 - 555 rue Hastings ouest
Vancouver (C.-B.)
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Your file Votre référence

Our file Notre référence

November 14, 1989

Roe Herring Industry

The enclosed 1990 Roe Herring Fishery Management Plan describes the licensing, inspection and management system that will be employed for your 1990 fishery. The allocation of 33,846 short tons to the 1990 roe fishery is well above the 26,467 ton coastwide average since 1983 when Area Quotas were first implemented. This quota will be allocated to licence seiners and gillnetters by attempting to achieve a 55%/45% : Sn/Gn catch split and provides for a seine catch of 18,615 tons and a gillnet catch of 15,231 tons

Roe herring fisheries will be in 5 separate areas as follows:

Licence Area	Seine Quota (Ideal No. Gears)		Gillnet Quota (Ideal No.Gear)	
Q.C.I. 2E	4000	(51)	1000	(87)
2W	1102	(14)	----	---
Pr. Rupert	1700	(22)	2137	(186)
Central	5300	(68)	2918	(254)
St. of Georgia	----	--	7800	(340)*
W.C.V.I.	6513	(84)	1376	(120)

* DOUBLE LICENCE SKIFFS

Please be reminded that area selection will be made on the application itself and will be considered as final unless a written request to change areas is received by Monday, January 15, 1990. Commencing December 20, 1989 the Department will telex up-to-date tallies of application numbers by area as we receive them.

If after January 15, there is an excessive imbalance in the amount of gear in any area, a short time period will be set up to allow for changes out of the over subscribed area in order to try and distribute the gear more evenly.

For gillnetters a TWO FOR ONE licensing system will be implemented in the Strait of Georgia only. This system will be reevaluated after the fishing season and does not imply that it will be re-instituted in the following year.

November 1989

MANAGEMENT PLAN FOR THE 1990 ROE HERRING FISHERY

The B.C. Pacific Roe Herring fishery generally takes place in late February to March in southern B.C. and mid March to mid April in North Coast waters with specific opening times and date announced on the fishing grounds by fishery managers.

The Area Licencing Management System will be implemented again for the 1990 season with important changes outlined below. The catch quota is based on a fixed exploitation rate of returning harvestable stocks. If recruitment is more or less than predicted the predetermined quota will not be adjusted in the current year. Accordingly, catch adjustments will be made the following year after escapement measurements and other stock status information is analyzed.

CATCH QUOTAS BY GEAR TYPE AND AREA (SHORT TONS)

LICENCE AREA		SEINES	GILLNETS	TOTAL
Queen Charlotte Is.	(2E)	3800	1200	5000
	(2W)	1102	0	1102
Prince Rupert		1337	2500	3837
Central Coast		5062	3156	8218
Strait of Georgia		0	6000	6000
West Coast Van.		6324	1565	7889
		17625	14421	32046

1. Stocks will be monitored in all major fishing areas and openings will be declared when warranted up to the limit of each licence areas gear quota.
2. South of Cape Caution no openings are anticipated in the Johnstone Strait area.
3. This is a general outline of the 1990 Herring Management Plan and does not supersede the appropriate Fisheries Regulations.

MANAGEMENT OBJECTIVES

1. CONSERVATION AND PROTECTION

The total B.C. Roe Herring catch in 1990 is 32046 short tons. All herring caught in the roe fishery are accounted for in the overall B.C. Herring Management Allocation Plan. Allocation of catch to all herring fisheries are made by fishery managers so that the sum total the fishery quotas for each area does not exceed the overall fishing quota for that area. The sum of the catch quotas in each area approximates 20% of the estimated stock as forecasted by the Pacific Stock Assessment Review Committee.

2. INTENDED USE OF CATCH

Herring caught in this fishery will have the roe removed to satisfy the Japanese market for Kazanoko (salted herring roe). The female carcass and the male fish are manufactured into meal and oil. The meal is mainly used for hatchery/aquaculture feed and the oil mainly for food and industrial products.

3. ECONOMIC VIABILITY

Since 1972 the Roe Herring fishery has by far the largest quotas of any other B.C. herring fishery and this reflects the lucrative nature of this fishery. Annual landings in the 1980's are about 30-35 thousand tons with landed values to fishermen exceeding $70 million each season. The roe herring fishery provides substantial income to the industry at a time of year when the salmon fishing fleet is idle.

4. EXPERIMENTAL INDIVIDUAL QUOTA FISHERY

As recommended by the Herring Industry Advisory Board, it is the intention of the Department of Fisheries and Oceans to explore the development of a small experimental Individual Quota (I.Q.) fishery. Subject to stock assessment, this is planned for Area 2W in 1991. The implementation will require consultation with industry to develop a plan with detailed mechanisms to address the following concerns:

1) A mechanism to ensure that the total catch remains within the quota.
2) Agreement(s) for equitable distribution of overage fish to unfilled Individual Quotas.
3) Agreement(s) for equal and fair division of catch amongst participants and a program to administer the user funded monitoring of landings.

Note: The IQ was recommended for 1990. However, planning requirements necessitate further review before implementation. In 1990, the Department will consider any industry (ie Area 2W licence holders) plan to pool or implement vessel quotas.

5. PUBLIC HEALTH

The B.C. Fish Inspection Regulations Require:

a. That all herring gillnet skiffs have areas where fishermen can stand to avoid standing on/in the herring. Fuel and hydraulic oil pump reservoir areas and fish holding areas must be separate. Skiffs should have self bailing systems for fish holds and standing areas separate from oil contaminated areas. No unpainted wood may come in contact with fish. Random inspections will be conducted on the fishing grounds.

b. That all herring seines have their fish holds inspected. Licencing seine vessels for catching/carrying fish requires that the vessel and its fish hold comply with rigid inspection criteria. Deck loads are not permitted.

c. All herring offloaded or processed in B.C. must be made at inspected processing plants. Processing of herring for human consumption requires handling and preservation "To a degree which ensures maximum quality of the end product" (Se 12 B.C. Fish Inspection Regs.).

5. LICENCE REQUIREMENTS

A. AREA CHOICE

a. The area marked on the licence application will be considered a final choice unless a written request to change areas is received by Monday January 15, 1990. Applications sent in without an area choice marked will not be considered complete. Completed applications must be received or postmarked no later than January 15. Fishermen are encouraged to send in applications as soon as possible. This will help us to provide better information on area choices as they are received.

b. Area choice totals will be telexed to Industry and field offices regularly starting on January 5, 1990.

c. Fishermen should check the area choice totals in order to decide whether or not they wish to request a change in area before the January 15 deadline.

B. APPLICATIONS

a. Applications may be delivered or mailed to either the Vancouver or Prince Rupert Licencing office.

b. Applications will be processed by Licensing after the January 15th deadline. Arrangements may be made, (on the form provided for this purpose), to pick up the licence either in our Vancouver or Prince Rupert office or to have it mailed.

If you wish to pick up the licence personally, please provide us with a telephone number where we may contact you when the licence is ready.

C. GILLNET LICENSING

a. C.F.V. Plates

C.F.V. Plates are no longer required for skiffs used only in the roe herring fishery. These have been recalled and may be returned to any departmental office in the Pacific Region. This includes District and Sub-District offices. Note:Skiffs which are also licensed in the 'C' category, (these have been issued two C.F.V. plates) should not return the plates, these should be left on the skiff.

b. Gillnet Plates

New roe herring gillnet licence plates (white in colour) were issued to all licence holders in 1987. These plates are to be used again this year. The previous year's decals must be removed before applying the 1990 decal. To make removal easier, it is suggested that the plate be heated briefly; try using a heat gun or a hair dryer on the back of the plate. The licence holder may fish any skiff he chooses, subject to the following conditions:

i) Gillnet skiffs must display a D.O.T. number (13K, 6K, etc.).
ii) The skiff must meet all fish hold inspection standards. Car top or smaller skiffs may not be used.
iii) Roe Herring licence plates with the 1990 decal attached, must be securely fastened to the skiff before the fishery, and remain in place until the fishery closes and the fish are delivered.

As in previous years, a net decal (smaller decal) will be issued along with the skiff decal. The net decal must be fastened to the scotchman or buoy at one end of the net. The scotchman must be clean and dry in order for the decal to adhere properly. The same end should be marked with a flag to show where the decal may be found.

The skiff which pulls the net must have the matching number decal and gillnet licence plate attached to it.

D. SEINE LICENSING

a. Roe Herring seine licence holders must name the boat to be used in the 1990 fishery.

b. After the 1990 application is delivered to the Department a request to change vessels may be considered if requested in writing by January 15, 1990.

c. One decal will be issued with each roe herring seine licence and must be fastened to the starboard side of the wheelhouse or hull prior to the fishery.

E. REPLACEMENT DECALS

Declarations for lost decals should be made to Fishery Officers on the fishing grounds prior to an area opening. If the loss is confirmed a replacement decal will be issued for a $10.00 fee. The replacement decal will be designated by an "R" and will be for the same area as the decal which was lost.

F. OPERATOR RESTRICTIONS

For the 1990 roe herring season, a licence holder may allow his licence to be fished by another person. Where an Indian has been issued a roe herring licence, an Indian must be on board the licensed vessel while it is engaged in the roe herring fishery.

G. LICENCE FEES

Roe herring, category H, issued to a non-Indian

Operating a:	Roe Herring Gillnet	$ 200.00
	Roe Herring Seine	$2,000.00

Roe herring, category H, issued to an Indian $10.00

6. ROE HERRING FISHERY REGULATIONS

A. GILLNET

a. No person shall use more than one section of herring gillnet. No person shall use a gillnet that is greater than 135 m in length.

b. No person shall use a gillnet containing more than 100 meshes in depth, the mesh size of which is less than 57 mm (2.25 inches) and not greater than 64 mm (2.5 inches).

c. Shaker panels shall not exceed a depth of 2 m with a mesh size not less than 150mm (6 inches).

d. Gillnets must be marked on both ends with buoys not less than 125 cm in circumference, and be of similar colour.

e. Gillnet fishermen must attach a gillnet licence decal to one end of his gillnet. A gillnet licence net decal shall:

a) be issued to the applicant with his herring roe licence;
b) be valid only for the licence with which it was issued, and
c) be clearly visible and at least 30 cm above the surface of the water.

f. When fishing with gillnets, no person shall leave any anchors, buoys or lines in the water during any closed time.

g. In fishing for roe herring from a punt, or while having roe herring aboard a punt, no person shall use or carry a greater length or depth or net in a hung condition than is permitted by the Pacific Herring Fishery Regulations. It should be noted that extra nets may be carried on accommodation vessels or motherships.

B. SEINE

A herring purse seine shall not be greater than 500 m (275 fathoms) in length, and mesh size not less than 25 mm (1 inch) extension measure.

7. ADMINISTRATION OF THE 1990 ROE HERRING FISHERY

1. The 55%/45% seine: gillnet catch division will apply in the 1990 fishery on an overall coastwide basis.

2. The Department will retain the one net per punt restriction for gillnets for the 1990 season.

3. Fishery Officers will ensure that sensitive herring spawning areas are protected from gear damage by establishing shallow water net boundaries inside which no fishing shall take place.

4. Vessels transferring catches from hold to hold must stand off the spawning grounds in areas designated as gurry grounds by the Fishery Officer according to Section 43 of the Fisheries Act.

5. The Department will continue its policy of attempting to achieve the best percentage of roe recovery compatible with sound conservation principles. It is the intention of the Department to open fisheries at the earliest opportunity given adequate stock size to achieve assigned quotas and optimun roe maturities. (i.e. Seine fisheries have taken place as early as March 11 in the Central Coast (Spiller

Channel-1985) and the potential exists for early fisheries in the Queen Charlotte Islands (Louscoone Inlet, Huston Inlet, Port Louis).

6. The precise opening time for seines will not be announced in advance. A time period in which the opening will occur will be announced on channels 78A VHF and 2318 HF; however, the precise opening time will occur within the time period previously set out. This opening announcement will be made on channel 79B VHF.

7. Gillnet fishery opening times will be announced as far in advance as possible and 78A and 2318 HF will be used.

8. Notice of closure will be as short as required for conservation purposes. For gillnet closures, enough notice will be given to provide reasonable opportunity for fishermen to remove their fishing gear from the water.

9. An attempt will be made to broadcast to the fleet anticipated times to fulfillment of expected catch quotas for an area to prevent vessels from travelling unnecessarily to areas that would probably close before they arrived.

10. Fishermen not licenced for the given area and the licenced packer vessel fleet must stand off fishing areas as designated by a Fishery Officer. Non compliance may result in a loss of fishing opportunities or prosecution.

11. The fleet is requested to avoid excessive disturbance of herring caused by vessels running back and forth over schools prior to openings. In some cases specific requests to stay off particular areas will be broadcast from patrol vessels and fishermen will be expected to comply.

12. Gillnet fishermen may use the net drum on their salmon fishing vessel to pull their roe herring gillnets across their punts, provided:

    - the punt is fishing a licence issued for the appropriate area;

    - all persons aboard the vessel engaged in the operation hold valid personal commercial fishing licences.

8. REPORTING OF CATCH

Catch by roe herring gillnet skiffs is to be reported under the "H" licence number.

Seine catch can continue to be reported under the C.F.V. # of catching vessel, although the addition of the licence number to the sales slip will also be helpful.

Fisheries
and Oceans

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V6B 5G3

Pêches - Région du Pacifique
Pièce 400 - 555 rue Hastings ouest
Vancouver (C.-B.)
V6B 5G3

Your file Votre référence

Our file Notre référence

JAN 22 1990

Dear Spawn-on-Kelp Licence Holder:

The enclosed copy of the 1990 Herring Spawn-On-Kelp plan will describe in detail the way in which the fishery will be conducted.

The plan was developed utilizing the herring management consultative process with consideration given to the appropriate allocation of the resource to each of the user groups. In 1990 2,600 short tons of herring or about 6% of the total coastwide catchable surplus was allocated to the spawn-on-kelp fishery.

In 1990 light pink coloured square pails will be used for all processed product as a condition of licence. Additionally, sequentially numbered decals for each bucket will be issued by the Department that will have to be applied at the time of processing. The pails, of course, will be available at your usual supplier.

As agreed to at our November 1, 1989 meeting between licence holders and the Department of Fisheries and Oceans your completed sales slips shall be submitted by September 15 after each season. The Department of Fisheries and Oceans agreed to acknowledge in writing the receipt of your completed sales slips.

Have a safe and prosperous 1990 fishery.

Yours truly,

A.F. Lill, P. Eng.
Regional Director
Fisheries Branch

Encl:

PC10-148/8 SOK1990.LET 90/01/11 (page 2)

Canada

ATTACHMENT 2

CATEGORY J LICENCE NO.

CONDITIONS

1. The following Terms and Conditions apply to all 1990 category 'J' licences issued under the authority of the Fisheries Act and Pacific Fishery Regulations, 1984.

2. All persons engaged in spawn-on-kelp operations shall comply with all Acts and Regulations applicable to a spawn-on-kelp operation.

3. Notwithstanding the generality of the foregoing, the following operational procedures shall also be complied with:

    (a) The following items shall be determined in conjunction with and approved by a Fishery Officer responsible for the geographic area in which the operation is to be conducted, and shall be indicated on the form title SCHEDULE A (Attachment 3) and the fully completed form shall remain attached to the licence at all times. Schedule A shall be completed prior to commencing operations under this licence.

    - The commencement and termination date of the pending operation;
    - The dates on which herring are authorized to be taken for impoundment;
    - The construction, type, marking and number of enclosures;
    - The geographic area and location of fishing for herring and of the enclosures;
    - The date on which enclosures are to be dismantled.

4. All captured or impounded herring taken as part of the fishing operation authorized by this licence shall be released following harvest of the spawn-on-kelp, except where specific arrangements have been made with the District Fishery Officer.

5. The maximum quantity of herring spawn-on-kelp authorized to be taken by this licence shall not exceed 8 (eight) short tons (7.26 tonnes) harvested product weight.

6. Where an unavoidable excess of production may occur, such overage may not be retained by the licence holder or any other person and shall be delivered, together with a fully completed Relinquishment of Claim Form, to an officer of the Department of Fisheries and Oceans for disposition as he may deem appropriate. Said Form is provided by the Department of Fisheries and Oceans and is attached herewith. (See Attachment 1).

7. Marine plants permitted for use as substrate are limited to the species Macrocystis, inergrifolia or Laminaria saccharina.

8. Prior to weighing spawn-on-kelp product at a processing plant, the product may be drained for a period up to a maximum of 12 (twelve) hours. The spawn-on-kelp landing must be reported to the local fishery officer prior to draining.

9. After weighing as per item #8, an allowance of 5% of the total weight will be deducted to allow for a reasonable remaining weight of liquid and salt. Any excess weight above the quota authorized by this licence shall be delivered in accordance with item #6 on a prorated basis by product grade.

10. All salted product is considered as part of the total production under the quota, and shall not be returned to the sea nor separate from the quota production except with the express approval of a Fishery Officer.

11. Containers used to pack and transport herring roe-on-kelp shall be constructed of approved materials (ie. Fiberglass, Plastic, Aluminum). Wood construction is not permitted.

12. Processed spawn-on-kelp shall be packed in containers of a specific colour and a known weight. This weight shall be recorded and produced upon request by a Fishery Officer or Fish Inspection Officer. Each season in Jan. - Feb. the colour designation of the containers will be specified by the D.F.O. and all product must be packed in these containers. For the 1990 season the colours of the buckets will be light pink.

13. In accordance with the Pacific Fishery Regulations Section 24(2), each container of processed herring spawn-on-kelp shall be marked with the number of the category J licence under the authority of which it was collected. Marking of containers shall be done in a manner authorized by an Officer of the Department of Fisheries and Oceans.

14. Catch/sales slip forms (Attachment 4) provided by the Department of Fisheries and Oceans are to be fully completed and returned to Lloyd Webb, Regional Herring Coordinator no later than September 15, 1990.

ATTACHMENT 3

CATEGORY J LICENCE NO.

SCHEDULE A

THIS SCHEDULE TO BE FULLY COMPLETED BY A FISHERY OFFICER

1. Commencement date of ponding operation ____________________

2. Termination of ponding operation ____________________

3. Date on which herring is authorized to be taken for impoundment ____________________

4. Number of enclosures permitted ____________________

   Type of enclosures permitted ____________________

   ____

   Marking of enclosures required ____________________

   ____

   Enclosure construction requirements ____________________

   ____

5. Geographic area and location of fishing for herring ____________________

   ____

   ____

6. Geographic area and location of enclosures (ponding operation)

   ____

   ____

   ____

7. Enclosures to be dismantled by ____________________ date

____

signature of Fishery Officer Office date

____

signature of Fishery Officer Office date

ATTACHMENT 4

1990 SALE AND CATCH REPORT
HERRING SPAWN-ON-KELP FISHERY

Name and Address Changes:
Name ____________
Address ____________
____
____
Tel. No. ____________

1. Details of Impoundments/Ponds:

DFO Statistical Area	Location	Percentage Production From Open Ponds	Percentage Production From Impoundments
		%	%
		%	%

2. Did you operate in a Pool: Yes _____ / No _____
If YES, list the names and licence numbers of other licence holders in your pool. ____________

3. Spawn-on-kelp Quota: 16,000 pounds drained weight.

4. Total landed weight (including overage): _________ pounds drained weight.

5. Quota Production and Overage of Processed Spawn-on-kelp.

	Quota Production				Overage	
	Number of Pails	Total Weight(lbs)	Price per pound($)	Value($)	Number of Pails	Total Weight(lbs)
Grade 1						
Grade 2						
Grade 3						
Grade 4						
Grade 5						
Grade 6						
Grade 7						
Grade 8						
TOTAL:						

6. Is this the final value of the product? Yes _____ No _____
If NO, when do you expect a final price settlement? _____

7. Product Sold To: Company: ____________
Contact Name: ____________
Telephone No: ____________
Processor: (if different from Company above) ____________

THIS FORM COMPLETED BY:

(Name) (Signature) (Date)

RETURN THIS COMPLETED FORM BY SEPTEMBER 15, 1990 TO:

Lloyd Webb, Herring Co-ordinator
Department of Fisheries & Oceans
400 - 555 West Hastings Street
Vancouver, B.C.

JANUARY 1990

MANAGEMENT PLAN FOR THE 1990 HERRING SPAWN-ON-KELP FISHERY

Each year the Spawn-on-Kelp Licence Holder's Committee meets with DFO representatives to discuss management concerns. In 1984, spawn-on-kelp fishery representatives were appointed to the Herring Industry Advisory Board, so that concerns of licence holders could be brought to the attention of both Industry and Fishery Managers.

Since 1979 there have been 28 spawn-on-kelp licences (J licence category) issued annually. The licence is not transferable, is issued to a person or Native Band and authorizes the holder to harvest a certain quantity of spawn-on-kelp; since 1980 each licence authorizes harvest of 8 short tons, except 1986 when a 6 ton quota was implemented due to an overall low herring stock size.

In 1990, a total of 2,600 tons of herring, have been allocated to the spawn-on-kelp fishery. The distribution of licences and herring allocation for each area is represented in Table 1.

TABLE 1

Area	Number of Licences	Herring Allocations (Tons)
Queen Charlotte Islands (Statistical Areas 1-2)	11	1100
Prince Rupert (Statistical Areas 3-5)	8	800
Central Coast (Statistical Areas 6-10)	5	300 (200)[a]
Strait of Georgia (Statistical Areas 11-18, 28)	0	0
West Coast Vancouver Island (Statistical Areas 19-27)	4	400
TOTAL	28	2600

NOTES: [a] From minor stocks.

(a) Product description including:
  - lot number or day code
  - number of buckets
  - weight per bucket and total weight
  - sequential numbers (from stickers issued by the department)
  - permit number (if more than one permit number, the amount supplied by each).

(b) Consignee.

(c) Consignor.

(d) Identifying marks.

(e) Date of shipment.

(f) Method of shipment - specific vessel or flight must be stated.

N.B. The certificate will be valid for product shipped only on the date as stated on the certificate.

(e) For export of the product from registered processing plants, square plastic pails with tight fitting lids are the most acceptable. These cause minimal damage to the product. In 1990 these pails must be of a Light pink colour as specified by the Department of Fisheries and Oceans. Lids and spacers can remain the normal white colour.

(f) Export containers must be properly labelled to show the name of the product, the weight and the processor or distributor. The containers must also indicate the date on which the product was packed so that if there are any problems the product can be segregated into lots without having to hold or delay the entire shipment. The licence number of the permit holder and a sticker numbered sequentially, as issued by the Department must also appear on the container.

(g) Product certification is a requirement of the Pacific Herring Fishery Regulations and all shipments must be accompanied by an export certificate issued by an Inspection Officer before the goods leave the registered plant.

When the lot is ready for inspection, application in writing must be made to any of the following:

Mr. Wayne Holmes
Fish Inspection Laboratory
Department of Fisheries and Oceans
4250 Commerce Circle
Victoria, B.C.
V8Z 4M2

Mr. Dale Paterson
Fish Inspection Laboratory
Department of Fisheries and Oceans
2250 South Boundary Road
Burnaby, B.C.
V5M 4L9

Mr. Merv Thorne
Fish Inspection Laboratory
Department of Fisheries and Oceans
Room 224 - 417 Second Avenue W.
Prince Rupert, B.C.
V8J 1G8

To issue the export certificate, the Inspection Branch will require certain information to satisfy the Department of Fisheries and Oceans' authorities. Therefore, your application must include the following information:

area approximates 20% of the estimated stock as forecasted by the Pacific Stock Assessment Review Committee.

2. INTENDED USE OF PRODUCT/CATCH

The naturally spawned herring eggs on macrocystis kelp is marketed mainly in Japan for the restaurant trade. In some cases herring from the ponds are sold for halibut bait after the spawning process is complete. Fishermen that employ the open pond method do not have opportunity to sell the spawned out herring for bait since no herring are caught or enclosed.

3. ECONOMIC VIABILITY

This fishery usually utilized about 5-6% of the total annual coastwide allocation. The economic benefits to fishermen have been high with annual landed values that steadily grew from $2.2 million in 1980 to a record high of $12.4 million in 1988. The landed value in 1989 was $8.5 million. The herring spawn-on-kelp fishery is a relatively small fishery that provides income to the industry from March through to May each season when much of the fishing fleet is idle.

4. PUBLIC HEALTH

To ensure product quality, all herring spawn-on-kelp harvesters and companies processing spawn-on-kelp must adhere to the following requirements:

(a) All herring spawn-on-kelp must be shipped to, graded, packed, labelled and exported from establishments possessing valid Federal Certificates of Registration as fish processing plants.

(b) Containers must be used to collect and hold spawn-on-kelp during harvesting and for transporting to the processing plants. These should be constructed of approved materials; that is, fibreglass, plastic or aluminum. They must also be fitted with rigid covers when holding product outdoors, to protect the product from weather and contamination. Any alternative proposal must be cleared by the local Inspection Officer.

(c) During the holding and transporting period the product should be kept chilled to prevent quality loss.

(d) All boats used for transporting herring spawn-on-kelp must have valid commercial fishing vessel licences and have passed boat inspection.

Allocations are made for each Area by estimating the quantity of herring that will be used in the spawn-on-kelp fishery. For each closed impoundment 100 tons are allocated and for open ponds 35 tons are allocated.

Production in excess of each fishermens' quota will be released to the crown by the licence holder using the attached "Relinquishment of Claim" form (Attachment 1) and will be sold later by Crown Assets. The grade of product released is to be in the same proportion as the grade mix in the total production of the licence holder. Details are specified in licence conditions (Attachment 2). As in 1988 and 1989 spawn-on-kelp landings will be measured by dockside drained weight. Details are specified in the attached conditions of the category "J" licence.

2. LICENCING REQUIREMENTS

Persons who were issued a category 'J' licence in 1989 may apply for a 1990 'J' licence. Issuance of a licence is based upon compliance with the Conditions of the previous year's licence and Licence Division requirements. These conditions include the return of a Sales and Catch Slip Report to the Herring Coordinator by September 15, 1990. The licence holder shall complete and submit the licence application specifying the desired area of operations, persons employed and vessels used in the operation. Any registered commercial fishing vessel may be used in the fishing operation; except category 'D' vessels may engage in transport only. All vessels used must have a valid commercial fishing licence and approved Fish Hold Inspection. The licence fees remain the same at $10.00 for Native Indians and $2,000.00 for other licence holders.

Marking of spawn-on-kelp ponds with the licence numbers, and removal of buoys, lines or other material used for fishing are required as part of the regulations. Licence holders are requested to remove pond frames from the water prior to June 30.

Once an application has been processed, the spawn-on-kelp licence with attached Conditions of the licence (Attachment 2) is sent to the Fishery Officer in the appropriate district and must be picked up by the applicant.

MANAGEMENT OBJECTIVES

1. CONSERVATION AND PROTECTION

All herring allocated to the herring spawn-on-kelp fishery are accounted for in the overall Pacific Herring Management Allocation Plan. Allocations to all herring fisheries are made so that the sum total of all fishery quotas for each area does not exceed the overall fishing quota for that area. The sum of the catch quotas in each

ATTACHMENT 1

DEPARTMENT OF FISHERIES AND OCEANS

FILE:

RELINQUISHMENT OF CLAIM

NAME: ADDRESS: PROVINCE: TELEPHONE:

BY THESE PRESENTS, ON MY BEHALF OR ON THE BEHALF OF MY HEIRS, EXECUTORS OR ADMINISTRATOR RELEASE FOREVER THE GOVERNMENT OF CANADA AND THE DEPARTMENT OF FISHERIES AND OCEANS FROM ALL MANNER OF ACTIONS, CLAIMS, SUITS OR DEMANDS IN ANY WAY AND DECLARE BEING FULLY SATISFIED WITH THE ACTION TAKEN AND THE SETTLEMENT OF THE FOLLOWING:

DESCRIPTION

____

____

____

____

____

____

____________________ Witness

____________________ Signature